SONAL COMPUTING MAY 16, 1995 VOL. 14 NO. 9 U.S. $3.95 / CAN. $4.95 / U.K. £2.95 ZD

EDITORIAL LIBRARY
REFERENCE
DO NOT
REMOVE

PC MAGAZINE

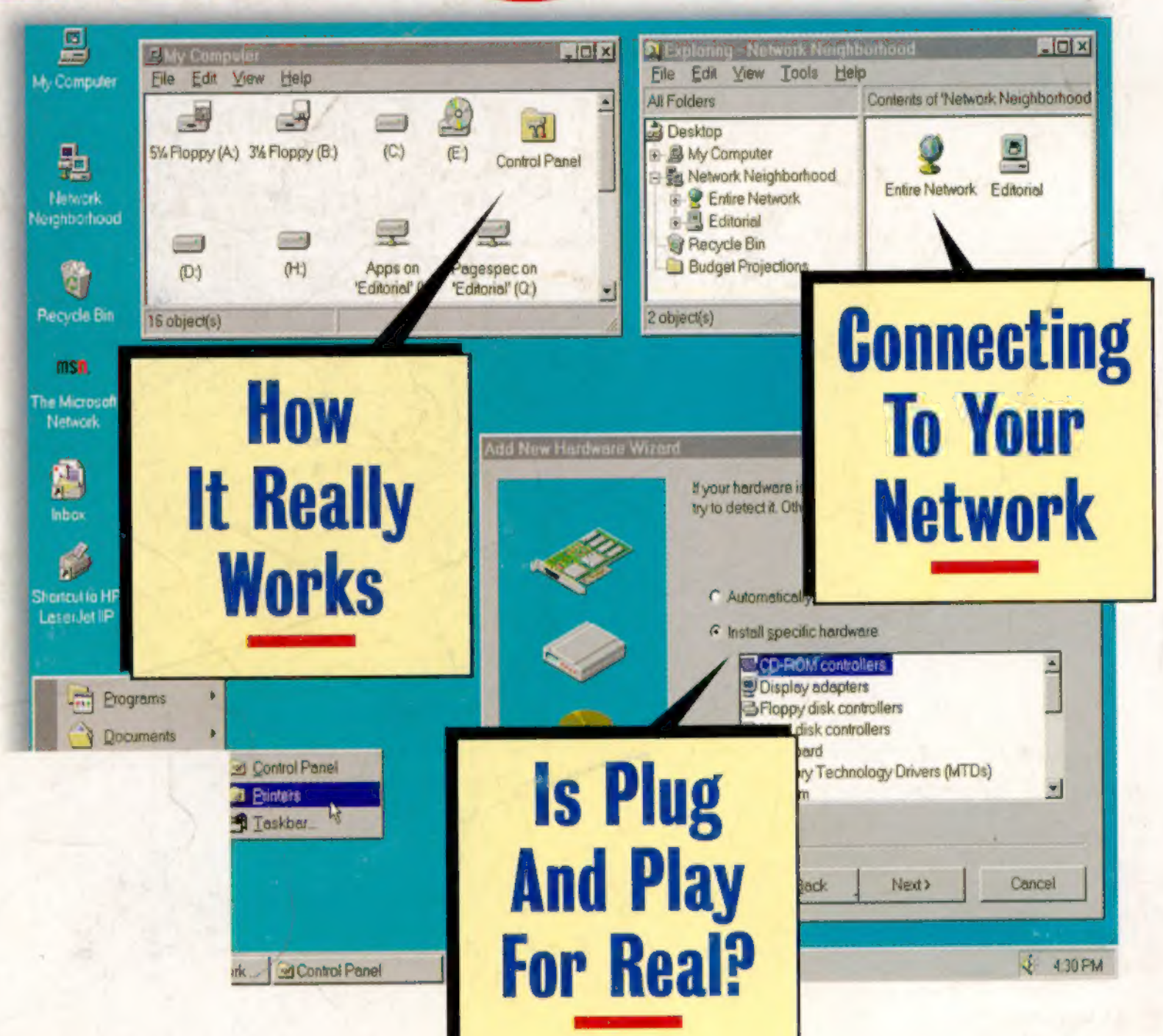
PC Magazine At Home
PC Labs Torture-Tests Nine Leading Home PCs

NETWORK EDITION

Doing Business on The Internet: We Look at Unix and NT Server Solutions

IBM's OS/2 Extends Its Networking Reach And Peer Services With Warp Connect

GETTING READY FOR WINDOWS 95



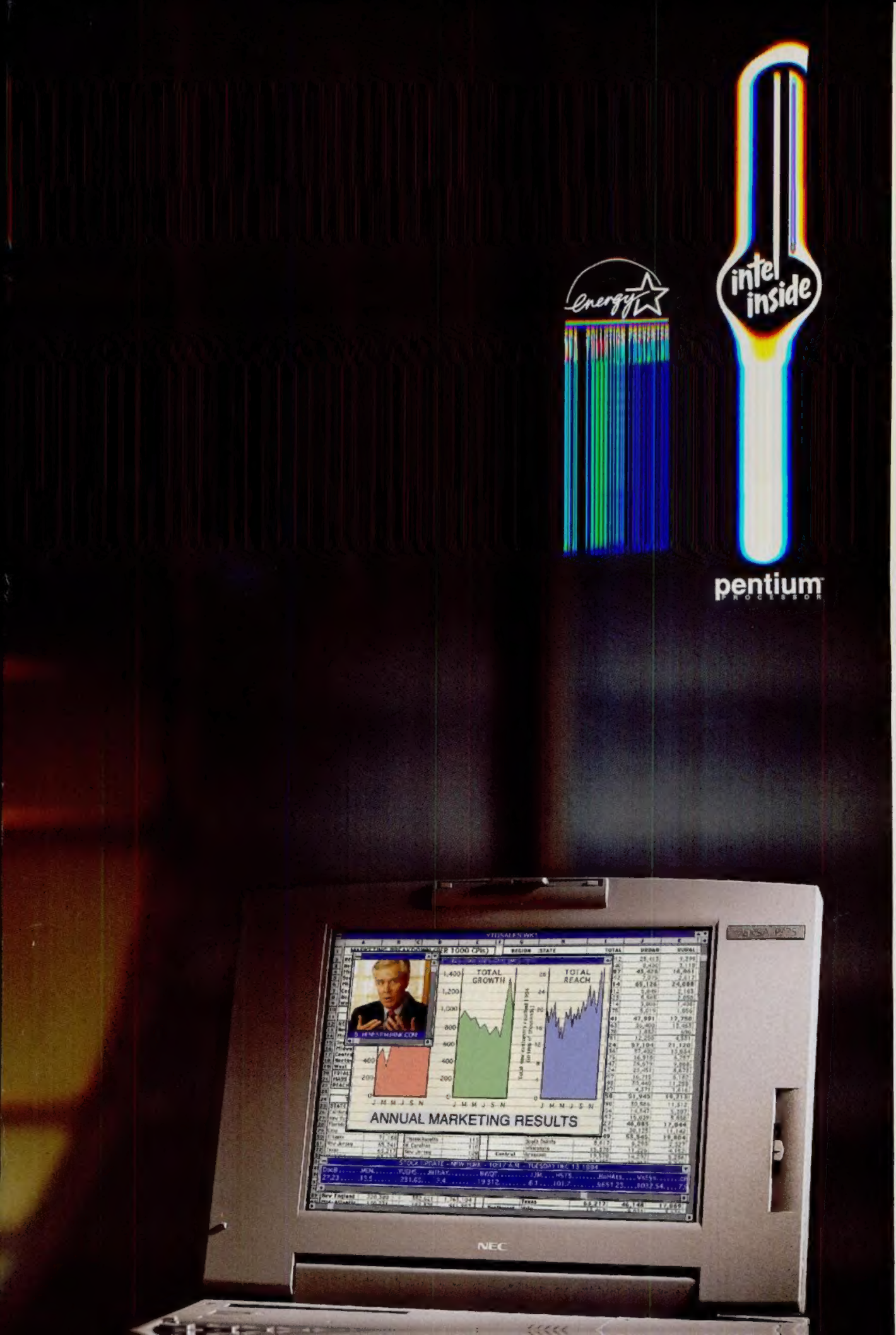
How It Really Works

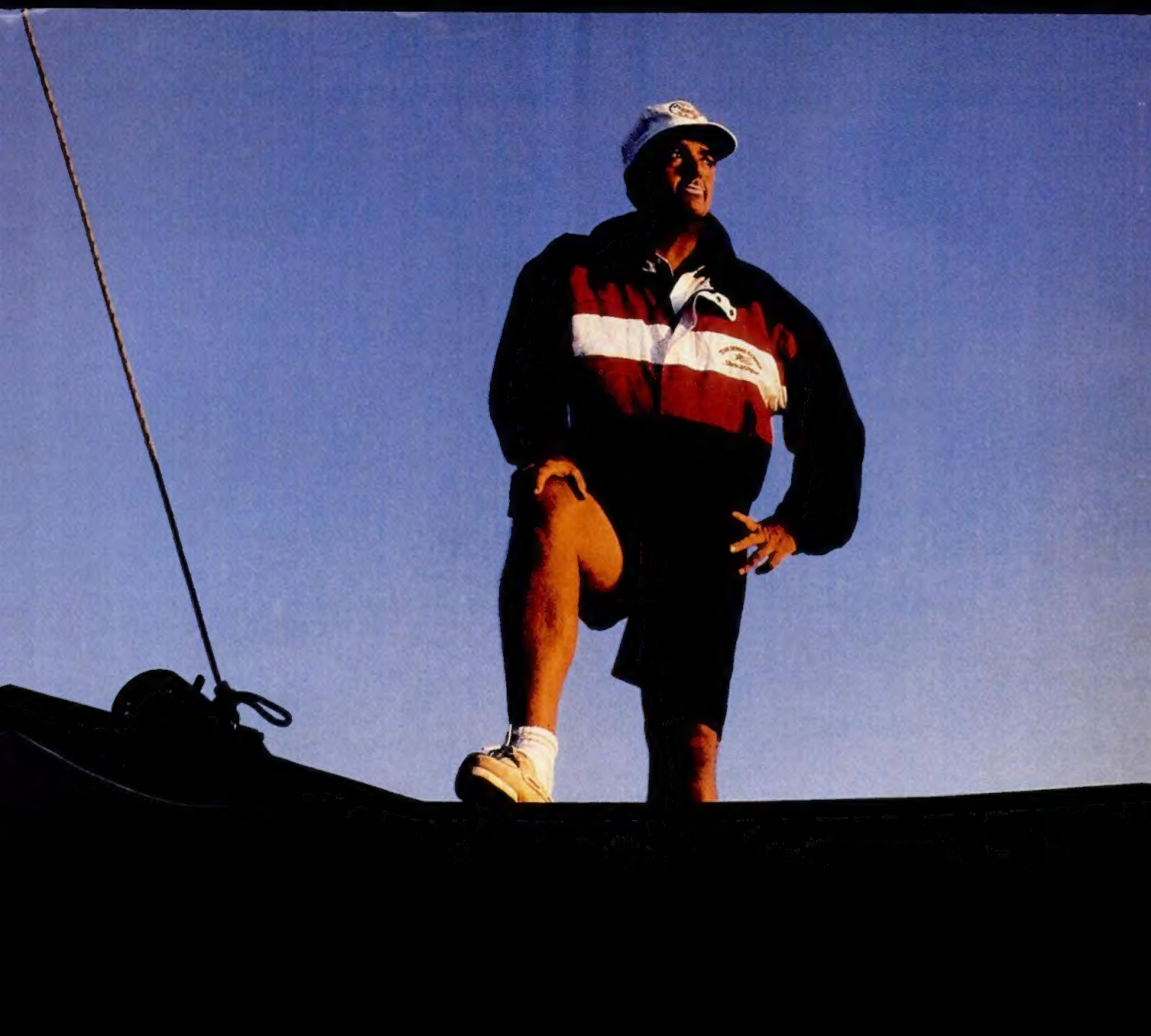
Connecting To Your Network

Is Plug And Play For Real?

Plus **John Dvorak vs. Jim Seymour**
Warp vs. Windows

JUST WHAT
YOU'VE WAITED FOR.
A NOTEBOOK
YOU DON'T HAVE
TO WAIT FOR.


energy
intel inside
pentium
PROCESSOR
TOTAL GROWTH
TOTAL REACH
ANNUAL MARKETING RESULTS
NEC



HOW CAN HE LOSE IN MAY WHEN HE'S ALREADY 12.5 SECONDS AHEAD IN JANUARY?

useful information, and help you see what the other guys miss. The shortcuts.

To put a little distance between yourself and the competition, call (800) 240-4782 Dept. XQV, and we'll send you information on Microsoft Excel 5.0 and the other programs that make up our winning team of Office applications.® After all, the race you're running probably isn't much different than Dennis Conner's. Because in the end, the only thing that matters is being at the last buoy first.

Microsoft

WHERE DO YOU WANT TO GO TODAY?®

are deaf or hard of hearing can reach Microsoft text telephone (TT/TDD) services by calling (800) 892 5234 in the US or (905) 568-9641 in Canada. Microsoft is a registered trademark and IntelliSense and Where Do You Want To Go Today are trademarks of Microsoft Corporation.

TECHNICALLY EXPLICIT MATERIAL ENCLOSED

PC Magazine CD—the most innovative PC tool ever developed.

Now 30% off when you subscribe!

It's one thing to read about cutting-edge technology. Now, with PC Magazine CD—the on-screen companion to PC Magazine—you can see, hear and interact with it.

Just one click lets you: Walk through the newest software suites…download PC Bench 9.0, Winbench 95 and Winstone 95…pull up data and results not available in print or online …experience exclusive multimedia product demonstrations…get working samples of real applications to run on your system…access everything ever published in PC Magazine during the previous 12 months.

All this at our lowest-time-ever rate of just $49.95 for four power-packed releases—30% off the single-disc price! Call right away to start your subscription to PC Magazine CD. There's nothing else like it on the market today!

Call: 1 800-335-1195

Mention Priority Code 8FAA

P.O. Box 59494 • Boulder, CO 80332-9494

Inside

Familiarity may breed contempt, but it also breeds a big comfort factor. As unwieldy as WIN.INI is, and as ire-producing as GPFs are, we've become good buddies with Windows 3.*x* over the last four years. We've tweaked and tuned, installed and uninstalled, and finally reached a comfortable level of coexistence.

Is it really time to say goodbye? And what are we saying hello to?

In this issue of *PC Magazine* we amass all of our expertise, roll up our sleeves, and dig down deep to help you decide if and when you should make your move.

Ehrenman and Flanagan: *PC Magazine* At Home.

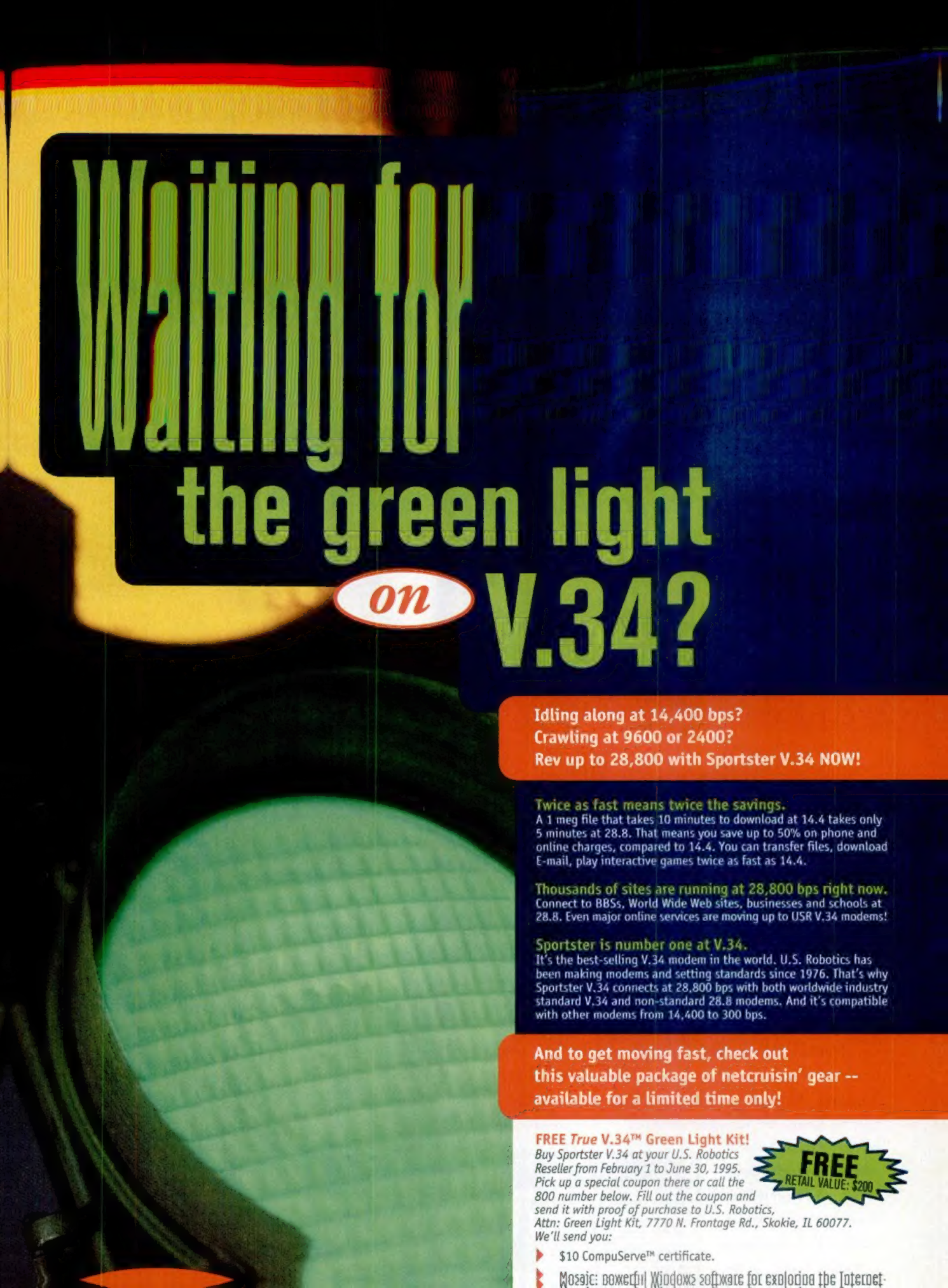
It's a big issue with lots to digest. Michael Miller, our editor-in-chief, takes you on a guided tour as no one else can. Jeff Prosise, our resident operating-system surgeon, takes apart Windows 95 to give you that under-the-hood perspective. Nick Stam and John Clyman tell the hardware side of the story, with hands-on testing of the new Plug and Play boards. Steve Rigney makes it perfectly clear that Windows 95 takes its networking capabilities seriously. And contributing editors John Dvorak and Jim Seymour find themselves on opposite sides of the coin in this year's version of "As the OS Turns."

As ballyhooed as it is, Windows 95 is by far not the only choice. Throughout our coverage we compare Windows 95's features with those of OS/2 Warp and Windows NT.

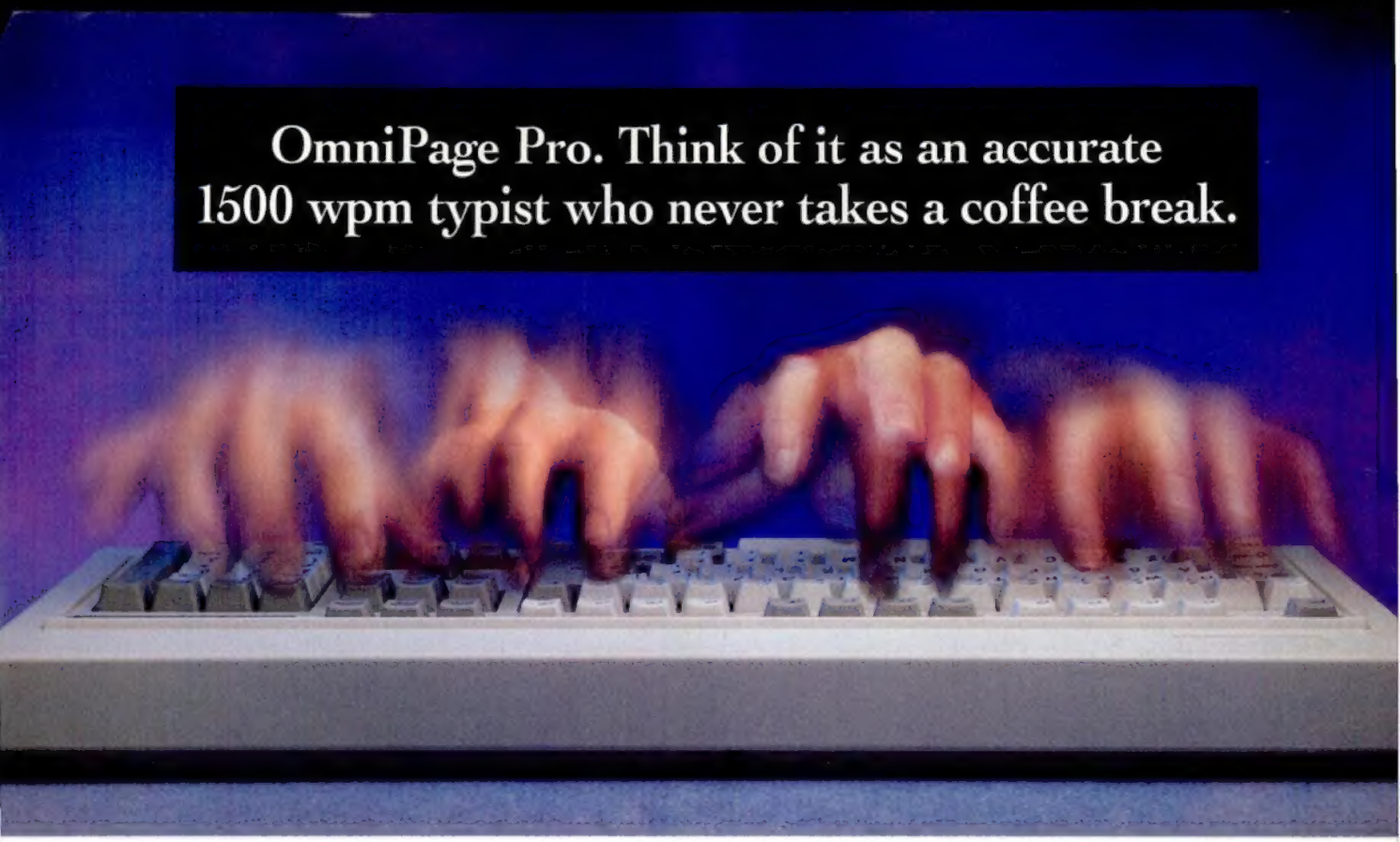
This issue also premieres *PC Magazine* At Home. In this new feature, we apply the same rigorous comparative testing to the growing number of home computers as in our reviews of business PCs. We even run a series of software compatibility tests to see which PCs are most likely to succeed with quirky consumer software. We think you'll find the waters considerably less muddy once you read this issue's coverage of Pentium-class home PCs. Gayle Ehrenman (our After Hours editor) and Bill Flanagan (our PCs team's staff writer) didn't get home until the wee hours so that you could make your home state-of-the-art. We will bring *PC Magazine* At Home to you at regular intervals throughout the year to help you keep your home on the cutting edge.—*Robin Raskin*

PC Magazine: The Independent Guide to Personal Computing, ISSN 0888-8507, is published twice a month except in July and August, at $49.97 for one year. Ziff-Davis Publishing Company, L.P., One Park Ave., New York, NY 10016-5802. Second-class postage paid at New York, NY 10016-5802 and at additional mailing offices. POSTMASTER: Address changes to ***PC Magazine***, P.O. Box 54093, Boulder, CO 80322-4093. GST Registration Number: R-123669673. Canada Post International Publications Mail Product (Canadian Distribution) Sales Agreement No. 266477.

Photograph by Thom O'Connor


Waiting for
the green light
on
V.34?
Idling along at 14,400 bps?
Crawling at 9600 or 2400?
Rev up to 28,800 with Sportster V.34 NOW!
Twice as fast means twice the savings.
A 1 meg file that takes 10 minutes to download at 14.4 takes only 5 minutes at 28.8. That means you save up to 50% on phone and online charges, compared to 14.4. You can transfer files, download E-mail, play interactive games twice as fast as 14.4.
Thousands of sites are running at 28,800 bps right now.
Connect to BBSs, World Wide Web sites, businesses and schools at 28.8. Even major online services are moving up to USR V.34 modems!
Sportster is number one at V.34.
It's the best-selling V.34 modem in the world. U.S. Robotics has been making modems and setting standards since 1976. That's why Sportster V.34 connects at 28,800 bps with both worldwide industry standard V.34 and non-standard 28.8 modems. And it's compatible with other modems from 14,400 to 300 bps.
And to get moving fast, check out
this valuable package of netcruisin' gear --
available for a limited time only!
FREE True V.34™ Green Light Kit!
Buy Sportster V.34 at your U.S. Robotics Reseller from February 1 to June 30, 1995. Pick up a special coupon there or call the 800 number below. Fill out the coupon and send it with proof of purchase to U.S. Robotics, Attn: Green Light Kit, 7770 N. Frontage Rd., Skokie, IL 60077. We'll send you:
FREE
RETAIL VALUE: $200
$10 CompuServe™ certificate.
Mosaic: powerful Windows software for exploring the Internet

OmniPage Pro. Think of it as an accurate 1500 wpm typist who never takes a coffee break.



Try this powerful OCR software just once, and you'll never go back to retyping documents again.

Nobody likes wasting time typing letters, faxes and reports back into a word processor. That's why OmniPage® Pro Optical Character Recognition (OCR) software is so valuable to scanner users. It's faster and more accurate than even the fastest typist. ■ OmniPage Pro reads through each page, hard-to-read characters. It's the most accurate OCR software yet. ■ Easily edit and format documents within OmniPage Pro, or in your favorite word processor. It's fully customizable, so you can tailor OmniPage Pro to your individual needs. Or train it to recognize special characters and symbols. You'll save lots of time and thousands of keystrokes. ■ Even the most complex layouts are no problem, because OmniPage Pro excels at handling both text and graphics on

TRADE UP

from your scanner's OCR software! Only

$149*

from any version of OmniPage, WordScan, or OmniScan SE, including the OCR bundled with your scanner.

Get these powerful new features:

- Increase accuracy with innovative neural network and Language Analyst™ technologies
- Retain original text and graphic layout with exclusive TruePage™
- Easily edit graphics with fully-integrated, 24-bit color Image Assistant

PC MAGAZINE

May 16, 1995 Volume 14 Number 9

UP FRONT

Inside
PC Magazine At Home 4

Letters
Consumer software buyers fight back 19

Trends
- Building PCs in less time
- Sanyo's pseudo 3-D displays
- Wavelet compression
- Folio's On-Line Business Library 29

First Looks

- HP ScanJet 3c
- HSC Interactive 2.0
- Sharp Zaurus ZR-5000
- Intergraph Transcend 1.0
- Toshiba Satellite Pro T2150CDT
- ABC FlowCharter 4.0
- VocalTec Internet Phone
- Diamond Stealth 64 Pro Video.....37

New & Improved
BY ASA SOMERS 61

Read Only
EDITED BY TIN ALBANO.....69

COLUMNISTS

Michael J. Miller
Help! I'm Drowning in Data!.....75

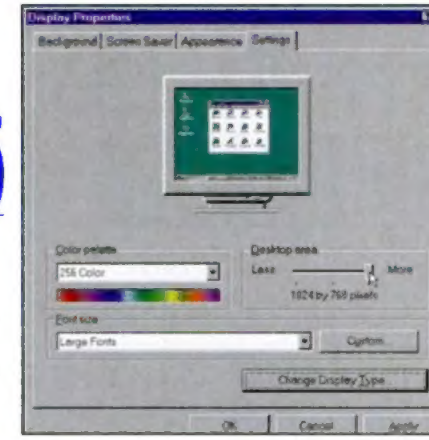
Bill Machrone
Taste vs. Technology 83
Second Looks.....85

John C. Dvorak
Gambling on a PC Near You 89
Inside Track.....91

Jim Seymour
The Changing Face of the Interface 93

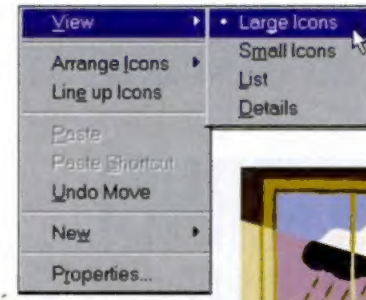
COVER STORY

GETTING READY FOR WINDOWS 95



BY MICHAEL J. MILLER

In a special four-part story, we examine this much-anticipated operating-system upgrade from every conceivable angle. Come along on a guided tour of Windows 95 and find out what's new, what's hot, and what's not. How does Windows 95 compare with today's Windows? With Windows NT? With OS/2 Warp? Should you plan on upgrading immediately? What are your alternatives? We have the information you need to make your choice.....102



New look, new architecture, and a slew of new questions.

OS/2 Warp and Beyond 110
Windows 95:
Myths and Realities.....112
Jim Seymour on Windows 95 ...116
John C. Dvorak on OS/2 Warp 117
Windows 95:
Going for the Logo.....119
Preemptive Strikes: Support Strategies for Windows 95 ...120
Windows 95:
New Software 130

UNDER THE HOOD: WINDOWS 95

And Its Competitors

BY JEFF PROSISE

Look deep inside Windows 95 and you'll find that its architecture is evolutionary rather than revolutionary, a complex mix of new functionality and older 16-bit structures that are still around to ensure compatibility with today's existing applications. What advantages does the design of Windows 95 have over those of Windows 3.1, Windows NT, and OS/2 Warp? And what are its drawbacks? The answers are surprising 139

Modern Architecture.....140
Is DOS Dead? Look Again 146
Windows 95: The Programmer's Challenge 150
Joining the Multimedia Party.....152

Cover Photography: Thom O'Connor (top)

PC MAGAZINE May 16, 1995 Volume 14 Number 9

COVER STORY

Plug and Play

EFFORTLESS UPGRADES

BY JOHN CLYMAN AND NICK STAM

Windows 95 promises a solution to one of the thorniest problems facing PC users today: how to make installing peripherals as simple as adding components to a stereo system. 159

Windows 3.1, NT, and OS/2....160
PnP Product Roster 166
Setting Up Your Hand-Me-Downs 170

Communicating with Windows 95

HOOKED AND LINKED

BY STEVE RIGNEY

If you manage a network, you must be wondering whether to upgrade your network clients to Windows 95. We look at how well Windows 95 works with NetWare, IBM LAN Server, and Windows NT Server, and how it compares with other client OSes 175

Built to Connect 176
Laptop Links 178
Dawn of the Universal Client? 188

FEATURE

Software

THE INTERNET MEANS BUSINESS

BY RICK AYRE AND DON WILLMOTT

Yes, you *can* reach out to potential customers and clients over the Internet effectively—and safely. We describe three ways to give your business a presence on the Internet 195

How Your Business Can Look on the Internet 196
The Internet's Explosive Growth 200
Building a Web Presence 205
Digital Road Map for Windows NT 208
Microsoft Windows NT Resource Kit 213
NetPublisher 220
Editors' Choice 208
Suitability to Task 213
Is Unix a Better Place to Be? 214
Will Your Business Be Safe? ...218
Three Routes to a Web Presence 224
Lotus Ties Notes to the Internet 228
Letting Customers Dig Through Your Data 233
What's Next for Servers? 237
Leveraging E-Mail 241
Successful E-Mail Strategies 244

AFTER HOURS

PC Magazine At Home

A PENTIUM FOR EVERY HOME

BY ALICE HILL

Home users no longer need to accept underpowered, underperforming office throwaways as their family PCs. In 1995, home is where the hardware action is heading. We look at nine Pentium-based systems that sell for less than $2,500 389

AcerAcros Pentium Minitower 394
AST Advantage! Adventure 6075p 395
Gateway 2000 P5-75 Family PC 402
IBM Aptiva 730 402
Leading Edge Fortiva Series 5000 405
Micron P90 Home MPC 408
NEC Ready 9510 410
Packard Bell Multimedia Pentium 411
USA Flex PT-75 MultiMedia Classic 416
Out-of-Box Software-Compatibility Tests...393
Editors' Choice 394
Reading the Report Card 395
Performance Tests 400
The Macintosh Option: The Performa 6110...405
Summary of Features 410

PC —Available on PC MagNet.

NETWORK EDITION

Follows page 95

Cover Story

Internet Servers: Publish or Perish? NE1
- BBN Internet Server NE6
- IT Solutions Neticity Workstation NE10
- Silicon Graphics WebForce NE14
- Sun Netra i5 Internet Server NE17

First Looks

- Vineyard NE19
- LANtastic Utility Pack NE19
- 3Com Fast EtherLink PCI 10/100 Parallel Tasking Adapter NE24
- HP PowerWise Uninterruptible Power Supply NE27

New & Improved

- NetWorth FastStack stackable hub system NE29
- Xircom Netaccess Multiport Modem Card NE29
- DAX 3.0 ....NE29
- FAXserve 3.0 ....NE29
- Combinet Everyware 2000 ....NE29
- Oracle Office 2.1 ....NE30
- ONET LANbooster 5000 ....NE30
- TeamTalk 2.0 ....NE31
- EFI Fiery XJ NE31
- Berkshire PC Watchdog NE33
- LAN Inventory 3.2 ....NE33

The Networker

BY DIANE DANIELLE

Help for Network Managers NE27

Multiple Access

BY FRANK J. DERFLER, JR.

OS/2 Warp Connect NE33

PC TECH

User-to-User

BY NEIL J. RUBENKING

Using various Shift-PrtSc key combinations under Windows; stopping the Windows 3.1 Startup group; a signal that printer echo is on 247

Tutor

BY JEFF PROSISE

It All Adds Up: How Computers Do Arithmetic 249

Tech Notes

BY BRIAN PROFFIT

Should Your Computer Go Non-FAT? 255

Extending Your Apps

BY BRIAN PROFFIT

Reading Notes Databases—Without Notes 263

Toolkits

BY BOB FLANDERS

Automate Your Software Testing 271

Power Programming

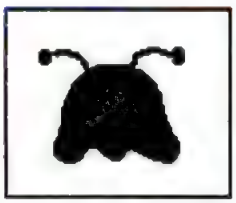
BY RAY DUNCAN

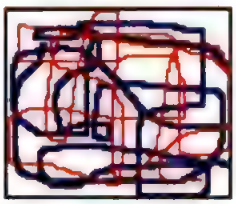
Setting Up a Web Server 273

Utilities

BY NEIL J. RUBENKING AND CARL FRANKLIN

GUIToons Livens Up Your Screen 283





PC SOLUTIONS

Hardware

Care and cleaning for your CD collection; radio frequency interference from a cheap mouse; squeezing life out of your obsolescent PC; speaker interference while printing 293

Operating Environments

The "Close Window on Exit" check box in PIF Editor; create an invisible icon 304

Word Processing

A problem with bookmarks in Word for Windows 6.0 308

Spreadsheets

An easier way to build nested functions in Excel 5.0 314

Databases

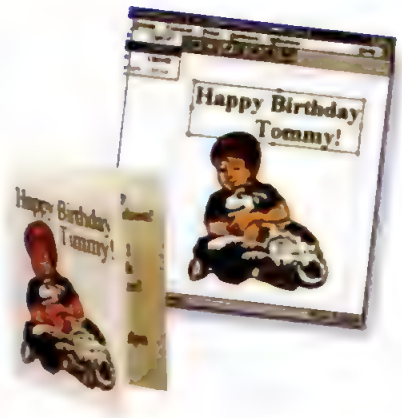
Understanding FoxPro's "Source is out of date" message 316

This issue's free utility, a screen saver named GUIToons, uses images that you choose (page 283).

AFTER HOURS

Abort, Retry, Fail?

BY DON WILLMOTT 428



Here's one way to confuse your kid (page 428).

ALSO IN THIS ISSUE

PC Direct 293
Marketplace 355
- Premier 355
- Classified 370
- BusinessCard 384

Reader Service Card 363
Advertisers' Index: Companies 423
Advertisers' Index: Products 424
Coming Up 426
Editorial Product Index 427

IT'S EVERYONE'S FAVORITE COLOR.

These days, getting so many critics to agree on a favorite of anything is, well, extraordinary. Then again, the EPSON Stylus COLOR is an extraordinary printer: the world's only color ink jet to produce output of 720 x 720 dots per inch. It prints photorealistic images bursting with vibrant, dazzling color. And it also delivers charts and graphs that jump off the page, with razor sharp black and white text. Yet, what's most remarkable is that the EPSON Stylus COLOR does all this for under $549! Then again, EPSON has been doing remarkable things with printers for over 15 years. So call our toll free number for the location of your nearest EPSON dealer. And discover the one color printer everyone is raving about.

To bring the best out of your EPSON Stylus COLOR printer, insist on genuine EPSON ink cartridges.

WOW!

"Out of a fleet of color ink jets, the Epson Stylus Color soars above the rest."
-InfoWorld

"Get ready to be wowed by the sharpness of the images and the vividness of the colors."
-Home Office Computing

"Offering high-quality prints of photographic images at an unheard-of-price."
-MacUser

"Epson has set a new standard with its first ink-jet color printer."
-Wired Magazine

"...The vivid output and exceptionally crisp text are hard to pass up."
-PC Magazine

The Amazing, Affordable EPSON Stylus COLOR Ink Jet Printer.

EPSON

1-800-BUY-EPSON
EXT. 3037

720 dpi printing requires EPSON coated paper (12.5¢ MSRP/sheet). Price may vary. Also prints 360 dpi on plain paper. EPSON and EPSON Stylus are registered trademarks of SEIKO EPSON CORP. All other trademarks or registered trademarks are the properties of their respective holders. ©1995 EPSON AMERICA, INC. 20770 Madrona Ave., Torrance, CA 90503. For dealer referral or warranty details, in the U.S. or Canada call 800-BUY-EPSON (800-289-3776). For Latin America, Call 310-782-0262.

Editor-in-Chief Michael J. Miller

Editor Robin Raskin

Executive Editors Rick Ayre, Bill Howard, Don Willmott

Executive Director, PC Labs C. James Galley III **Art Director** Laura Baer

Senior Networking Editor Frank J. Derfler, Jr.
Senior Editors David Greenfield (Networking and Communications), Brian Nadel (First Looks), Sebastian Rupley (West Coast)

Managing Editor Paul B. Ross **Assistant Managing Editor** Dianne H. McDonald

Senior Associate Editors Ted Stevenson (Software), Sharon Terdeman (Technical Columns) **Associate Editors** John Clyman (PCs), Gayle C. Ehrenman (After Hours), Leon Erlanger (Hardware), Carol Levin (Trends), Thomas Mace (Applications Development), Gail Shaffer (Networking and Communications), Lance N. Ulanoff (Graphics) **Technical Editor** Neil J. Rubenking **Senior Production Editor** Kim Schueler **Production Editor** Monica Sirignano **Copy Chief** Glen Boisseau Becker **Staff Editors** Tin Albano, Jamie M. Bsales, Kathleen Caster, Elisabeth H. Holzer, Ellyn J. McCasland, Michael W. Muchmore, Todd Spangler, Sarah L. Roberts, Michael Ryan, Craig L. Stark, Carol A. Venezia, Leslie Wygant, Anush Yegyazarian **Senior Writer** Robert S. Anthony **Staff Writer** William P. Flanagan **Assistant Editor** Asa Somers **Senior Copy Editors** Jeanne Albrecht, Jill Léger **Copy Editors** Elliot Thomas Grant, Joseph N. Levine, Ann Ovodow, Tracy Reppert **Assistant Copy Editors** Marian Berelowitz, Peter J. McLaughlin **Layout Manager** Linda Harms **Senior Layout Editors** Thomas DeVito, Lillian Gaffney **Layout Editor** Shari L. Girouard **Library Assistant** Dolores Williams **Senior Editorial Researchers** Brad Stilwell, Jodi L. Wynblatt **Editorial Researchers** Mary E. Behr, Eryn R. Brown, Yvonne Koulouthros, Cade Metz, Gregory Sewell **Editorial Assistant** Melissa J. Perenson **System Support Manager** Craig Ellison **PC Support Analyst** Melvin Acevedo **Production System Support Manager** Patricia Perkowski **Communications Manager** Diana Garelik **Assistant to the Editor-in-Chief** Tara Solon **Assistant to the Editor** Rita Aprahamian **Assistant to the Executive Editors** Christina M. Evelyn **Administrative Assistant** Christina Okang **Sysop, PC MagNet** Ken Hippie

Contributing Editors Bill Machrone (VP, Technology), Douglas Boling, Bruce Brown, Brian Butler, Sheryl Canter, Diane Danielle, Ray Duncan, John C. Dvorak, Michael J. Mefford, Edward Mendelson, Charles Petzold, Alfred Poor, Jeff Prosise, John R. Quain, Sal Ricciardi, Steve Rigney, Winn L. Rosch, Joe Salemi, Jim Seymour, Richard Hale Shaw, Barry Simon, Luisa Simone, Craig Stinson, M. David Stone

Senior Associate Art Director Donna Panagakos **Associate Art Directors** Charles Conover, Richard Demler, Curtis M. Fields **Assistant Art Director** Le Chau (Betty) Thai **Associate Graphics Director** David Foster **Graphic Artist** Mark Tyner **Assistant to the Art Director** Frieda T. Smallwood **Contributing Photographer** Thom O'Connor

Director, PC Labs, West Coast Steve Buehler **Technical Directors** Ben Z. Gottesman (Software), Robert P. Lipschutz (Networking and Communications), Nick Stam (Hardware) **Director, Operations** John R. Delaney **Project Leaders** Richard Fisco (PCs), Thomas Kreyche (Client/Server), Jeff Mace (Graphics), Jay Munro (Applications Development), Amarendra Singh (Software), Jeffrey G. Witt (Networking and Communications), Michael J. Zulich (Hardware) **Programmers** Richard V. Dragan, Kenneth Prakobchart **Product Testing Manager** Charles Rodriguez **Senior Technical Analysts** John Garris, O. Ryan Tabibian **Technical Analysts** Daniel A. Begun, Alan Chan, Laura Cox, Tim M. Crawford, Kason Leung, Anatoliy Nosovitskiy, Margaret A. Piemonte, Deval Shah, Dan Smith **Support Technicians** Peter Bastide, Bruce Deodat, Charles Lin, Melanio Lopez, Denis Tom, Mark Valentine **Inventory Control Coordinators** Bryan Hughes, Rob Graydon, William Pagan **Administrative Assistant** Jacqueline Paredes

PC MAGAZINE CD
Executive Editor Peter McKie

PC MAGAZINE ON-LINE
Associate Editor Jenny Donelan **Technical Associate** Thomas W. Giebel **Staff Editor** Angela Hickman

Publisher Daniel Rosensweig

Publishing Director Jim Stafford

National Associate Publisher Nancy Newman **Associate Publisher, Marketing** Susan Delman **Publisher, Network Edition** Karla Spormann **National Sales Manager** Bill Stephen **Business Manager** Chris Eisenhardt **Director, Business Development** John Wisdom **Client Services Manager** Steve Robinson **Events Manager** Dawn Gudelis **Manager, Promotion and Public Relations** Lynne Hasluck **Research Managers** Elyse Berman, Audra Lee

Senior Advertising Production Manager Lori Iaccino **Advertising Production Manager** Susan Conrad **Assistant Advertising Production Managers** Barbara Adams, Robert Joy **Editorial Production Manager** Pamela J. Berkowitz **Coordinator, Editorial Production** Louise Laberge

Advertising Office: One Park Ave., New York, NY 10016-5802; 800 33 MAG AD, 212-503-5100

Ziff-Davis Publishing Company
Chairman and CEO Eric Hippeau

Business Media Group
President Ronni Sonnenberg

Executive Vice President Claude P. Sheer **Vice Presidents** Joseph Gillespie (Magazine Networks), Bob Bader (Central Advertising Sales), Don Byrnes, Al DiGuido, Dan Farber, J. Sam Huey, Michael J. Miller, Paul Somerson, Jim Stafford **Executive Directors, Ziff-Davis Magazine Networks** Ellen Atkinson, Anna Zornosa **Managing Director** Lucy Wohltman (Ziff-Davis Preferred Customer Program) **Directors, Ziff-Davis Magazine Networks** Ann Fitzpatrick, Mark Glasner, Michael Kreiger, Jeff Lehman, Scott Murphy **Marketing Director, Ziff-Davis Magazine Networks** Michael Perkowski **West Coast Marketing Director, Ziff-Davis Magazine Networks** Jeff Bruce **Director, Public Relations** Brenda Wheeler **Co-Directors of ZD Benchmark Operation** Bill Catchings, Mark L. Van Name **Director, ZD Labs** Bob Kane

Ziff-Davis Publishing Company
Presidents J. Scott Briggs (Consumer Media Group), Jeff Ballowe (Ziff-Davis Marketing and Development), Bob Brown (Computer Intelligence/InfoCorp), J.B. Holston III (International Media Group)

Senior Vice Presidents Baird Davis (Circulation), Rachel Greenfield **Vice Presidents** Tom McGrade (Assistant to the Chairman), T.L. Thompson (Business Manager), James F. Ramaley (Circulation Services), Elda Vale (Corporate Research and Analysis), Timothy J. Mitchell (Controller and Treasurer), J. Malcolm Morris (General Counsel and Secretary), Bruce W. Bourne (General Manager), Rayna Brown (Human Resources), Herbert Stern (Marketing and Development Group), Roger Herrmann (Production), Bill Machrone (Technology) **Chief Information Officer** Wellington Y. Chiu **Executive Director, Information Systems** Owen Weekley **Executive Director, Marketing Services** Jim Manning **Production Director** Walter J. Terlecki **Director of Licensing** Jean Lamensdorf **Director of Public Relations** Gregory Jarboe

Subscription Inquiries, Address Changes

Subscription Services: For subscription service questions, address changes, or ordering information, call toll-free 800-289-0429 in the U.S. and Canada; all other countries, please call 303-604-7445 or fax 303-604-0540. Or write to *PC Magazine*, P.O. Box 54093, Boulder, CO 80322-4093.
Subscription Rate: The subscription rate is $49.97 for a one-year subscription (22 issues). Canada and all other countries, please add $36.00 for postage.
Back Issues: For back issues (subject to availability), $8 per issue ($9 outside the U.S.), send check or money order to Back Issues Dept., Ziff-Davis Publishing Company, P.O. Box 53131, Boulder, CO 80322-3131.
Computer Select: *PC Magazine* is available on Computer Select, a CD-ROM published by Computer Library. For subscription information, call Computer Library at 800-827-7889, ext. 708.

How to Contact the Editors

We welcome letters. However, we cannot look up stories from past issues, recommend products, or diagnose problems with your PC by phone. Send your written questions, complaints, and compliments to *PC Magazine*, One Park Ave., New York, NY 10016-5802. Please include a daytime telephone number. Send electronic mail to MCI Mail box 157-9301, to CompuServe address 72241,104, to Internet address *157.9301@mcimail.com*, or to PC MagNet (see below). *PC Magazine*'s general number is 212-503-5255. The West Coast Operations number is 415-378-5500.

If you are dissatisfied with a product advertised in *PC Magazine* and cannot resolve the problem with the vendor, write (do not call) Amy Cimetta, Advertising Department, at the above address. Include copies of your correspondence with the vendor.

PC Magazine does not accept unsolicited manuscripts. We will pay $50 for Solutions and Programming user tips and for Abort, Retry, Fail? submissions. If you submit artwork or newspaper clippings with Abort, Retry, Fail?, mark up the photocopy, not the original.

PC MagNet

PC Magazine operates PC MagNet, an on-line service of ZiffNet, hosted by CompuServe. To join, set your communications software for 7 data bits, even parity, 1 stop bit, and full duplex. To find the number nearest you, dial 800-346-3247. (In Canada, dial 800-635-6225, voice only.) At the Host Name prompt, enter PHONES. Follow the menus, note the number closest to you, then hang up and dial the number. At the HOST NAME prompt, enter CIS. At the USER ID prompt, enter 177000,5000. Enter PC*MAGNET at the PASSWORD prompt and PCMCIS95 at the ENTER AGREEMENT NUMBER prompt. When you join ZiffNet, you will be enrolled in both ZiffNet and CompuServe, for a charge of $13.45 a month. The connect-time charge is $4.80 an hour, billed by the minute. Areas free of connect charges for ZiffNet members are PC Magazine Editors' Choice awards, the ZiffNet Magazine Index, Buyers' Resources, Newsbytes, ZiffNet Highlights, and the current Utility (type GO ZNT:FREEUTIL). For ZiffNet member services, call 617-252-5566. You can also visit *PC Magazine* on the World-Wide Web at *http://www.ziff.com/~pcmag*.

You can download the current utility free from *PC Magazine*'s BBS at 617-231-4450 or, if you are on the Internet, download the utility from our anonymous FTP server at *ftp.pcmag.ziff.com*.

Permissions, Reprints

Material in this publication may not be reproduced in any form without permission. If you want to quote from an article or use *PC Magazine*'s logo in conjunction with an Editors' Choice designation, write Chantal Tucker; for information on reprints in quantities of 500 or more, write Carol Peters.

PC Magazine Reviews

Except where noted: All *PC Magazine* reviews are of currently available products. Benchmark and performance tests are run on Compaq Deskpro 486/33M's.

Editorial and Business Office: One Park Ave., New York, NY 10016-5802. Editorial: 212-503-5255; Advertising: 800 33 MAG AD, 212-503-5100.
Copyright ©1995 Ziff-Davis Publishing Company. All rights reserved; reproduction in whole or in part without permission is prohibited. The following are registered trademarks of Ziff-Davis Publishing Company: PC, *PC Magazine*, PC Labs, PC MagNet, PC Magazine Award for Technical Excellence, PC Magazine Editors' Choice Award. The following are trademarks of Ziff-Davis Publishing Company: Abort, Retry, Fail?; Direct Marketing Connection; First Looks; Lab Notes; New & Improved; PC Marketplace; PC Solutions; PC Tech; Pipeline; Power Programming; Read Only; Tutor; User-to-User.

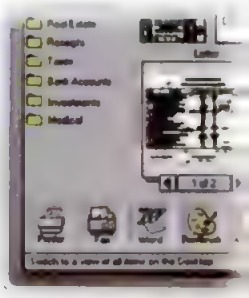
PRINTED IN THE U.S.A.

PaperPort.™ The fastest way to get paper into your computer.

If it's on paper, it's PaperPort-able!

Okay, so you have no trouble getting paper out of your PC. But what do you do with the articles, letters, receipts, and business cards—the important papers—that cross your desk every day? You use PaperPort, that's what! The first truly simple, super-small input device that converts your paper documents into electronic ones. **Always ready to go.** Just plug PaperPort into your PC's serial port (there's no card required) and then feed in a piece of paper. PaperPort grabs the paper, scans it and launches the software automatically—there isn't even an ON button! **Instantly useful.** At six seconds per page, PaperPort begins to display your documents on the screen even before you're through entering them! Store documents in folders and you've got permanent electronic copies that you can retrieve at any time using PaperPort's easy-to-use search tools. **Streamline your work.** With PaperPort's direct links to word processors, OCR software (included!), printers and fax modems, you can file, edit, annotate, print and send your documents directly to others. All for under $400. Want to find out more? Call us at 800-787-7007, division PM. **PaperPort. It's the in thing for your PC.**

Fitting comfortably between your keyboard and monitor, PaperPort becomes an integral part of your desktop.



File your documents in folders using long file names. Then one click will print it, another will fax it, and a third will convert it to editable text. What could be easier?

VISIONEER

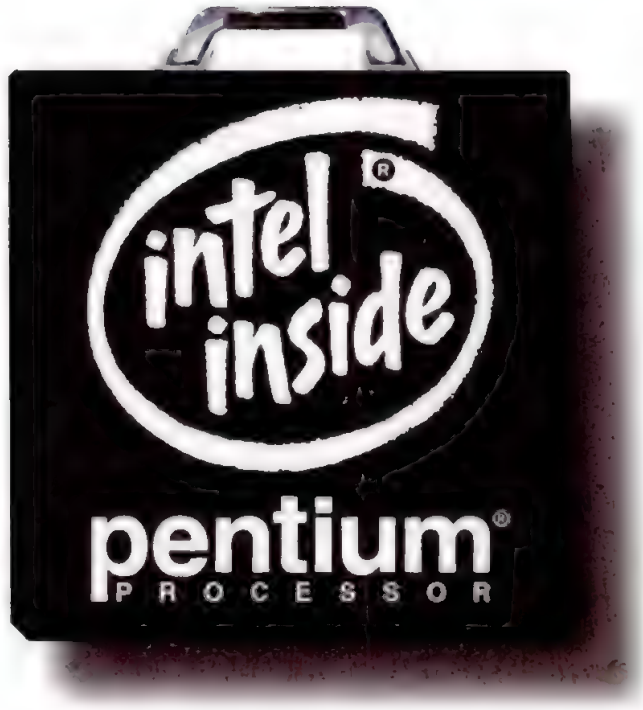
CIRCLE 283 ON READER SERVICE CARD

Upgraded version. Formerly called PaperMax.™

Now available in a notebook.

Power and portability are no longer mutually exclusive. Now you can have both with an Intel Pentium® processor-based notebook. In fact, all of today's most

© 1995 Intel Corporation. For more information on the Intel Pentium processor family contact Intel on the Internet at http://www.Intel.com/procs/pentium/



demanding desktop software including office suites, multimedia and 3-D graphics, now runs just as great on your notebook.

intel

AN NEC MULTISYNC® MONITOR?
AT THIS PRICE?
DID SOMETHING FREEZE OVER?

Well, here's something you probably didn't expect. Those premium NEC monitors that always seemed a bit beyond your reach have now eased their way right into your price range. Introducing the NEC MultiSync XV Series. Featuring our new 17" monitor (15.6" viewable image size), the optimum size for today's applications at the incredible price of only $799.*

MultiSync XV Series monitors are not only designed for your budget, but for the eyes of the people who will use them. Eyes that demand sharp detail, bright colors and crystal-clear images. Which is precisely what these monitors deliver.

The XV Series also delivers the legendary quality and reliability you expect from NEC, and is backed by a 3-year limited warranty – one of the best in the industry.

MultiSync XV17™
$799 ESP
17" Flat Square Technology CRT
(15.6" viewable image size)

Max. Res: 1280 x 1024 NI at 60 Hz
Recommended Res:
1024 x 768 NI at 76 Hz**

MultiSync XV15™
$460 ESP
15" Flat Square Technology CRT
(13.8" viewable image size)

Max. Res: 1280 x 1024 NI at 60 Hz
Recommended Res:
1024 x 768 NI at 76 Hz**

MultiSync XV14™
$330 ESP
14" Non-Glare CRT
(13.0" viewable image size)

Max. Res: 1024 x 768 NI at 70 Hz

Plus, the XV Series is ideal for both PC and Macintosh® systems and is one of the only monitor lines in its class to offer Microsoft® Plug and Play compatibility.

In short, the new MultiSync XV17 and the entire XV Series gives you yet another compelling reason why you should consider a separate monitor purchase, and not just settle for the monitor that comes bundled with a system.

The new NEC MultiSync XV Series. Above and beyond your expectations, not your price range. Call 1-800-NEC-INFO for more information. For information sent via fax, call NEC FastFacts™ at 1-800-366-0476 and request catalog #1.

SEE, HEAR AND FEEL THE DIFFERENCE.

NEC

*Estimated selling price. **Maximum resolutions based on horizontal and vertical frequencies only. NEC cites recommended resolutions for optimal display performance. See, Hear and Feel The Difference, XV17, XV15, XV14 and FastFacts are trademarks and MultiSync is a registered trademark of NEC Technologies, Inc. All other trademarks are the property of their respective owners. NEC GSA#GS00K94AGS3241 ©1995 NEC Technologies, Inc.

CIRCLE 157 ON READER SERVICE CARD

If You're Not Using MapInfo To See Your Data, You Could Run Into Problems, Too.

Ouch.

Looking at your data without MapInfo® desktop mapping software is like flying blind. That's because only MapInfo has the power to combine your database and spreadsheets with maps to create colorful pictures, rich with information. Allowing you to look at your data with new clarity. And see things you've never seen before.

MapInfo is the first PC software to truly leverage the power of geography. Over 85% of data has a geographic element. And MapInfo uses it to combine and visualize your data in countless new ways, letting you then perform sophisticated data analysis. So once hidden relationships, patterns and trends jump out with eye-popping sharpness. New opportunities become crystal clear. And previously incompatible data sets are combined to present fresh solutions to business challenges. Bottom line: MapInfo actually helps you make smarter decisions faster.

There are already over 300 off-the-shelf MapInfo applications, covering virtually every industry.

Which is why hundreds of thousands of people around the world are already improving their insight with MapInfo. To optimize sales territories. Target media campaigns. Carry out site analysis. Track field service personnel. Find the nearest store location. Locate buried fiber optic cable. Dispatch ambulances. Evaluate insurance risk. Assess storm damage. Route cargo. Analyze crime patterns. Speed delivery. Plan land use. And so much more.

Call us today at 1-800-327-8627 for our new, free demo. It's a real eye-opener.

Sept. 19, 1994

MapInfo

TURNING DATA INTO DECISIONS.™

Federal sales 1-800-619-2333 Outside U.S.: 1-518-285-6000. MapInfo runs on Windows™, Macintosh®, Sun® and HP®. MapInfo is a registered trademark and "Turning Data Into Decisions" is a trademark of MapInfo Corporation. All other trademarks are property of their respective owners.

CIRCLE 291 ON READER SERVICE CARD

031200

Letters

CONSUMERS SPEAK OUT

Jim Seymour's column "Consumer Software's New Rules" (January 24, 1995) struck a nerve with our readers, many of whom wrote in with their own horror stories.

All too often, my experience has been similar to Seymour's: "Daddy, why can't you make it work?" I've come to expect anywhere from 30 minutes to a couple of hours setting up my system before I or my children can play a game. I've concluded it's easier to set up individual AUTOEXEC.BAT and CONFIG.SYS files for each program than to try to have one universal setup.

JOSEPH B. SHAFFER, *via the Internet*

I applaud Seymour's column. It exposes a significant problem that inflicts considerable frustration and dissatisfaction on the average home PC user. Consumer software developers take note: Get out of your vacuum, put yourself in our shoes, and write software that will run where the average PC owner lives and spends his money—out here in the real world.

KEN TURLEY, *Big Timber, Montana*

Recently I purchased the Star Trek Interactive Technical Manual. I installed it on my PC, only to find that it repeatedly caused system crashes. I don't want my money back, however; I spent $70 on this program because it's the only program of its kind. Perhaps we as consumers should be willing to pay just a little more per title, so that manufacturers can produce workable products and better customer support, and we can avoid disappointing three-year-old children who can't hear Simba roar or grown-ups who want to wander on the *Enterprise*.

JENNIFER SARANTITES, *via the Internet*

Although I agree with Seymour's column 100 percent, simply returning the software is not always an easy decision, as Seymour indicated. For Christmas, I purchased the Lion King Animated Storybook. In order to make that thing work, I had to download a new video driver, reconfigure Windows, and confer with customer support on three separate occasions. After three weeks of fiddling, my wife imploring me to return the software, and customer support no longer answering my e-mails, I realized it was the implied slight on my computer knowledge that made me refuse to return the merchandise.

JIM WILSON, *via PC MagNet*

As personal-computer users enter the mainstream of consumer electronics, the issues Seymour addresses will increasingly become a headache for new software users. I applaud Seymour for bringing them to light.

JERRY COBB, *via the Internet*

Developers need to write software that runs in the real world of PC owners.

Seymour missed a perfectly good argument against buggy consumer software: The Uniform Commercial Code's Implied Warranty of Merchantability states that goods must be fit for the ordinary purposes for which they are sold. If software has known bugs that prevent it from being used fully, then the sale can be interpreted as a breach of this warranty. More consumers need to assert their rights in this area.

DOUGLAS M. FLAGG, *via the Internet*

Seymour was right to give IBM's OS/2 Warp a thumbs down for its terrible installation routine. But his suggestion that buyers turn it into shelfware is the wrong answer. The answer is to treat software like any other defective, fraudulently marketed product: Demand a refund. Only by making the dealer and IBM accountable is justice done, and perhaps then vendors will finally learn something. If everyone were to return a product, how long do you think it would take to fix the problems?

DAVID NASON, *via the Internet*

GOVERNMENT TIES THAT BIND

Given the problematic social issues that evolve along with telecommunications, it's inevitable that government will become more involved in information technology (Bill Howard, "Mr. PC Goes to Washington," January 24, 1995). High tech creates as many problems as opportunities, and the private sector is unlikely to address them all. By way of analogy, would we prefer no government involvement in roads, and the elimination of those annoying, government-mandated stop signs?

RON LEGRO, *via the Internet*

All in all, Howard's comments are right on the money. Some things are better off without the government's involvement.

AL RECHANY, *via the Internet*

HEY, MR. POSTMAN!

In addition to the measures John C. Dvorak outlined in his column "E-Mail Love and War Stories" (January 24, 1995), there's a simple and easy way to increase your Internet e-mail security: encryption. If the unfortunate lovers had used, say PGP, 99 extra recipients would have been confronted with ASCII garbage—instead of a love letter.

PATRICK LAMB, *via the Internet*

E-mail can't be unsent, but mail sent the old-fashioned way can. Dropping a letter in a mailbox isn't equivalent to hitting the Send button; you can "unmail" a letter at any time until it is actually delivered.

STEVEN GOLDBERG, *New York, New York*

Dvorak touched on several key areas and good ideas; however, I was surprised he didn't mention encryption. Encryption is the closest thing to putting a private e-mail letter in a sealed envelope. Most people would never think of writing a personal love letter on a postcard.

JOHN WILSON, *via the Internet*

AS THE MICROSOFT TURNS

Michael J. Miller's remarks in his column "The World According to Microsoft" (January 24, 1995) are on target. Microsoft has achieved dominance by doing a better job of giving customers what they want—or think they want—and doing so through excellent marketing and a solid product line. Those who decry Microsoft's dominance take heart: If Microsoft ships a flub in Windows 95, OS/2 Warp might jump in and fill the void, at last creating a competitive environment for operating systems. Microsoft is on top only because we voted them there with our wallets.

MICHAEL J. ZAMBETTI, JR., *via the Internet*

BACK IT UP

A hearty commendation on your article "The Bigger Backup" (February 7, 1995). The importance of backup can't be overstressed. Unfortunately, backing up is like going to the dentist—everyone agrees it's necessary, but few relish the task.

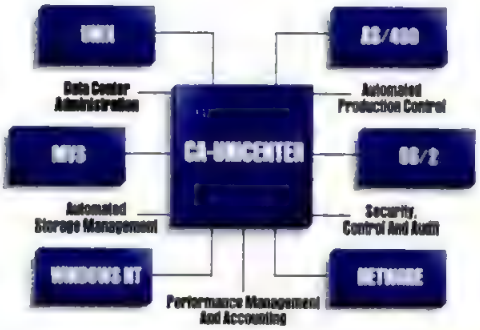
BOB ZEIDMAN, *via the Internet*

The roundup of tape backup solutions was certainly impressive. But it was useless to those of us who use OS/2, as there was no mention of the systems these devices can back up.

DON MESSENGER, *via the Internet*

Presenting The 7
Of Systems Mana

1 Replace Disparate Point Products With A Single, Integrated, Comprehensive Solution.



2 Choose A Client/Server Application That's Interoperable, Scalable and Portable.

3 Demand An Open Solution That Supports All Key Industry Standards And Protocols.

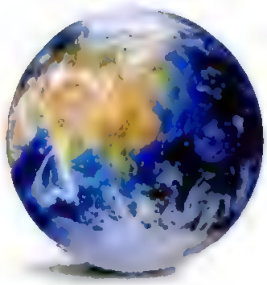
COMPUTER ASSOCIATES
Software superior by design.

Commandments gement Software.

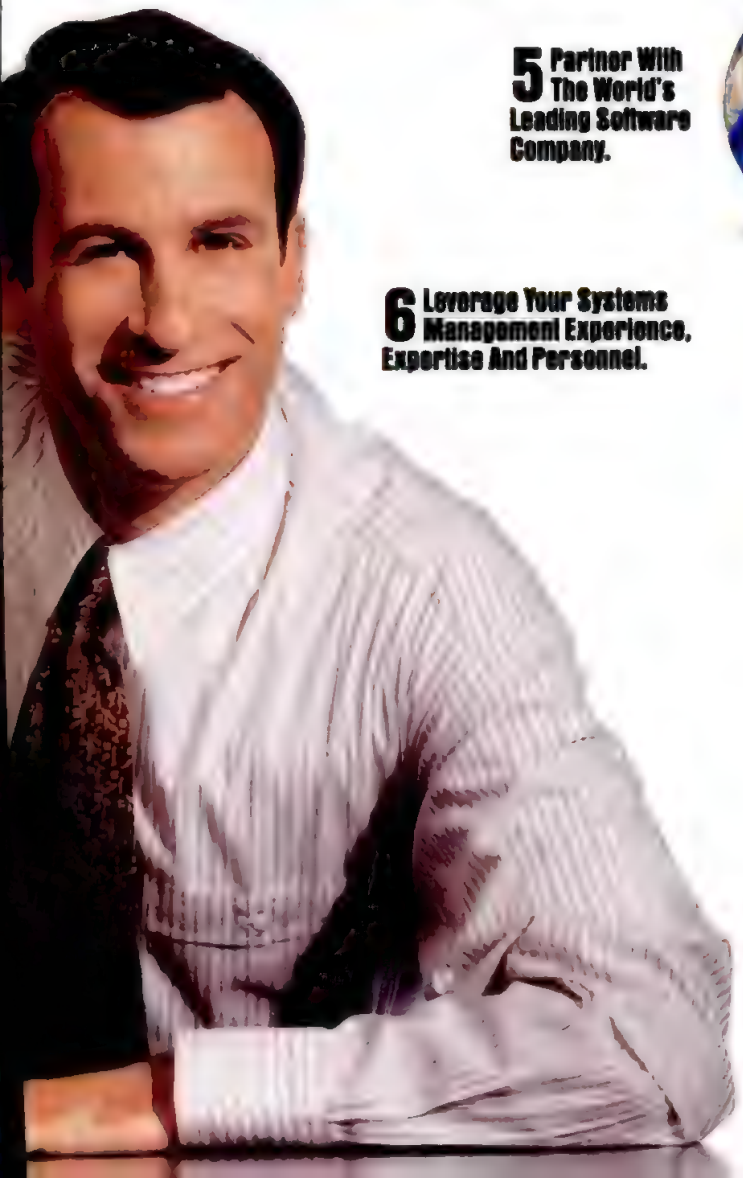
4 Standardize On A Common GUI Interface That Makes It Easier To Use. Reduce Training Costs And Boost Productivity.

7 Protect All Your Data With Bulletproof Security Software That Supports Every Platform And Operating System Across Your Entire Enterprise.

5 Partner With The World's Leading Software Company.



6 Leverage Your Systems Management Experience, Expertise And Personnel.



When choosing your systems management software, you shouldn't have to make a leap of faith. And with new CA-Unicenter,® you don't have to. Because CA-Unicenter is the single, integrated systems management solution that solves all of the challenges of managing client/server computing across heterogeneous platforms.

So call today for more information about the systems management software you can believe in: CA-Unicenter.

Call 1-800-225-5224 Dept. 10007 For More Information And To Register For The CA-Unicenter Software Giveaway.

CIRCLE 348 ON READER SERVICE CARD

CA-Unicenter®

Integrated Client/Server Systems Management Software

© Computer Associates International, Inc., Islandia, NY 11788-7000. Offer good in U.S. and Canada only. All other product names referenced herein are trademarks of their respective companies. Requirements for Software Giveaway available through toll-free number.

Letters

Your article completely missed the point of tape backups. You say not a word about compatibility and reliability, which are far more important than the performance speed of a backup drive. An unreliable backup is worthless no matter how fast it is.

ROLAND DEWIT, *Potomac, Maryland*

INFRARED'S CROSSED WIRES

In general I like Jim Seymour's idea of infrared networks ("IR: Fast, Cheap, and Soon Ubiquitous," February 7, 1995). But I have nightmares about Seymour's scenario of making "an IR modem link to an airport or airline travel club pay phone, without our little 'defeat the phone system' toolkits." Because then everyone in my general area could also see what I was transmitting.

BRUCE O'NEEL, *via the Internet*

The idea that every hotel will soon have an IR port sounds wonderful, but I'm willing to bet that you won't see it happen this century. Today, you're lucky just to find a hotel with a modular connector or phone jack near the desk, let alone something as sophisticated as digital phone lines.

JOEL F. BERMAN, *via the Internet*

REVEALING CODES

Two thumbs down to your First Looks review describing WordPerfect 6.1 for Windows' Reveal Codes window as "awkward" ("WordPerfect Adds Speed and Grace to Power," January 24, 1995). When using my Microsoft Word 6.0, which has now become a dust collector, I'm not sure that the esteemed Sherlock Holmes could always figure out what's going on in a document. On the other hand, with WordPerfect's Reveal Codes window, even my child can do so.

ROGER ROTHERBERGER, *Hamilton, Georgia*

ADULT DECISIONS

I wholeheartedly share John C. Dvorak's opinion (Inside Track, January 24, 1995) that pornographic—er, pardon me—"adult entertainment" software products should not be mixed in with the business and developer products at Comdex. I only wish *PC Magazine* would come to its senses and rid an otherwise fine magazine of sleazy pornographic advertising.

PATRICK COLVIN, *via the Internet*

We, too, constantly find ourselves grappling with this problem. Historically, as magazine publishers, PC Magazine *and Ziff-Davis Publishing Company have believed the proper course of action is to offer a wide latitude for disseminating information about all computer-related goods and services.—Ed.*

HISTORICAL PERSPECTIVES

Although I agreed with most of Charles Petzold's article "Why Windows 95? A Historical Overview" (January 24, 1995), I couldn't let this one slip by. Petzold says that Microsoft learned from IBM's mistake of asking people to learn a new environment. If this was true, why are there so many Windows APIs?

ROBERT D. MISIAK, *via the Internet*

Windows users are not wedded to their interface; Microsoft acknowledges this by their significant update to the interface for Windows 95. Once forced to migrate to a new interface, users can find both Windows 95 and OS/2 equally appealing. Inertia, as Petzold says, is not the major discriminant between these two platforms.

RICHARD ENG, *via the Internet*

TAXING TIMES

As a longtime TurboTax user, I agree that TurboTax got the interface right this year ("Happy Returns After a Taxing Year," February 21, 1995). For the past several years, the failure of TurboTax to become easier to use with experience was annoying, but the switch from last year's unfriendly style to the easy-to-use version this year is much appreciated.

CHRIS G. WHIPPLE, *via the Internet*

In truth, when you review a product, it is only part of the story. It would be beneficial to your readers to expand your focus and also review the company behind the product—especially as it relates to the manner in which the company services its customers: avenues made available for accessing assistance, response time to inquiries, the quality of service, and the like. We as consumers are buying the entire package, not just the software, and we don't want to be sold a bill of goods.

BOB JOHNSON, *via the Internet*

I've used tax preparation software for many years, and have used electronic banking for many more years. I do it because it is convenient and saves me money. If the IRS really wants taxpayers to file electronically, then the price, which now ranges from $15 to $20 or more per return, must come down. The advantages for taxpayers and the government are tremendous, both in reducing errors and lowering the cost of processing returns. Saving the paper isn't a bad idea either. But the taxpayer's paying a $15-plus surcharge to save the government money is not really encouraging. Eliminate the cost and let the taxpayer realize the benefit of quicker refunds without the additional cost to them, and the goal of 94 percent electronic returns by 2000 is not farfetched.

STEVE MEYER, *via the Internet*

Your review of tax software was both accurate and useful. All in all, I've found TurboTax satisfactory at getting the job done as painlessly as possible. I like the fact that the look and feel does not change significantly from year to year. My only complaint was regarding one item that did not get appropriately transferred on the form; TurboTax's response was that one can enter the numbers manually on the state form. Ha!

KURT WOLFSBERG, *via PC MagNet*

Next year's tax software review should contain a customer-service rating based on the experiences of this year. Looking through the CompuServe and other on-line forums for tax software should give you the data you need for rating customer service.

DAVID M. ABBOTT, *via PC MagNet*

CORRECTIONS AND AMPLIFICATIONS

In our roundup of tax preparation software ("Happy Returns After a Taxing Year," February 21, 1995), we recognized Intuit's TurboTax for Windows Headstart edition with an Editors' Choice award. *PC Magazine* wants to alert readers to the fact that in specific circumstances calculation errors have been identified by Intuit in the final versions of TurboTax for Windows and TurboTax Multimedia. Contact Intuit at 800-224-0948 for further information.

We similarly want to alert readers that several bugs have been identified in Block Financial Software's TaxCut, a package we also recommended highly in the same roundup. Contact Block Financial Software at 800-829-1829 or via fax at 800-944-6322 for further information.

HOW TO CONTACT US

We welcome your comments and suggestions. Please send Letters to the Editor via

THE INTERNET *157.9301@ mcimail.com*

COMPUSERVE 72241,104, or to individual editors as listed on ZiffNet (type GO PCMSTAFF)

FAX 212-503-5799

MAIL Letters, PC Magazine, One Park Ave., New York, NY 10016-5802

All letters become the property of PC Magazine *and are subject to editing. We regret that we cannot answer letters individually. To send submissions for PC Solutions, please see the sidebar "How to Contact Us" on the second page of that column.*

WE'VE ALWAYS SAID OUR MONITORS ARE TRIUMPHS OF TECHNOLOGY. NOW, IT'S OFFICIAL.

The Nokia 447X has just been named a Best Buy by *PC World*. This adds to a long and growing list of awards and honors for Nokia monitors.

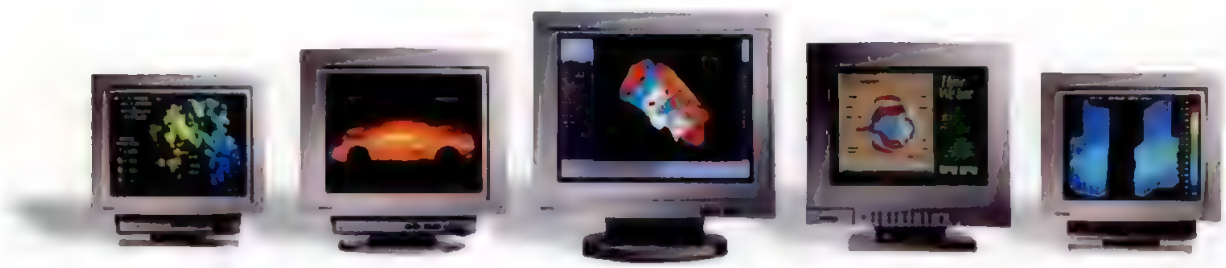
Ever since their introduction in the U.S., Nokia has been recognized by editors and sophisticated users alike as technologically superior. The displays are brilliant and tack-sharp. The ergonomics are an exuberant expression of Nokia's European home.

Nokia "firsts" read like a history of advanced monitor technology; including the world's first TCO and MPR II-certified emissions control and the first all digital monitors with on-screen menu controls.

As the need for quality monitors expands into more homes and businesses, the appreciation of Nokia excellence grows with it. And, as more people look into Nokias, they are finding more than technical superiority. They're finding superior value.

So if you're considering an upgrade of your monitor, be sure to consider a Nokia. Obviously, the experts already consider them the best you can buy. For more information and the name of a dealer near you, please contact us at 1.800.BY NOKIA.

NOKIA
MONITORS



Nokia monitors reduce eyestrain when used with an appropriate graphics card. Manufactured and designed in Finland, in an ISO 9001 approved environment. ©1995 Nokia Display Products Inc. Multigraph, Visiongraph, VisionMission and FullScreen are trademarks of Nokia Display Products Inc. E-Mail: bynokia@aol.com. Prices and specifications subject to change without notice. The Energy Star emblem does not represent EPA endorsement of any product or service. All other trademarks are the sole property of their respective companies.

ZEOS Meridian™ Notebooks...

Meridians with unretouched photos of active matrix displays.

Top-Notch Speed Demons.

Vroooom! ZEOS Meridian notebooks are setting the pace—racing through application after application. They're swift and powerful. They're the *Indy*sputable performance champs.

And they just got faster! Added to our already speedy Meridian line is the ZEOS Meridian 850 notebook featuring a Pentium-75 processor.

While each Meridian product is distinct, they all have several hot features that add to their impressive speed and ease of use including local bus video; a comfortable palm rest with an integrated TruePoint™ pointing device; and an 84-key keyboard.

Meridian 400 Subnotebook

At 3.9 pounds, the Meridian 400 subnotebook is molded from a special carbon-fiber material that cuts weight and improves durability. And with your choice of a 486DX2-50 or DX4-100 processor, hard drives to 350MB, and RAM that's user upgradable to 20MB, this notebook is "faster than a speeding desktop," as *Computer Shopper* said.

PC World agrees: "Featherlight, blazingly fast, elegantly designed... richly deserves its Mobile PCs power ranking."

The 400 features three screen options: active color and dual-scan color or monochrome. You also get two Type II PCMCIA slots and an external ultra-light (9 oz.) 3.5" 1.44MB floppy drive (included in Packages 2 and 3).

Meridian 800 Notebook

"With it's sleek styling, solid construction and hot performance, the Meridian 800C justifiably earns it's place at the top...." reported *Windows Sources*.

We couldn't agree more! At 6.3 pounds, the Meridian 800 full-size notebook is light enough to travel anywhere yet it's large enough to use for presentations and everyday computing. And with your choice of a 486DX2-50 or DX4-100 processor, removable hard drives now to 528MB, and RAM that's user upgradable to 20MB, this notebook is the raciest thing around.

For your viewing pleasure, the 800 is available with your choice of color displays—a whopping 10.3" dual scan or 9.5" active. You also get two Type II or one Type III PCMCIA slots, and an internal 3.5" 1.44MB floppy drive.

Meridian 850 Notebook

Ultimate horsepower that takes the checkered flag! The Meridian 850 notebook gives you supreme Pentium performance in a mighty small package that weighs only 6.8 pounds. It's light enough to race around the world with you yet it's powerful and fast enough for the most demanding computing.

For turbo power, the Meridian 850 comes with a Pentium-75 microprocessor; 8 or 16MB RAM—that's user upgradable to 32MB—with 256K SRAM cache; and removable hard drives to 810MB. For the best

Purchase orders are subject to approval. Business leasing programs available. All prices, specifications and availability are subject to change without notice: call to confirm these and warranty details. Prices do not include shipping. The Energy Star emblem does not represent TruePoint are trademarks of ZEOS International Ltd. (c) 1995 ZEOS International Ltd., 1301 Industrial Blvd., Minneapolis, MN 55413 USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS)

viewing, the 850 is available with your choice of color displays—a mammoth 10.3" (800 x 600 resolution) dual scan or 9.5" active matrix. You also get 16-bit stereo sound through audio jacks (Sound Blaster Pro compatible) for the best in portable multimedia, two Type II or one Type III PCMCIA slots, and an internal 3.5" 1.44MB floppy drive.

Buy With Confidence

No matter which ZEOS notebook you purchase, you'll be getting the best service and support in the business! ZEOS has won seven *PC Magazine* Readers' Choice for Service & Reliability awards. And, ZEOS was the first to provide 24-hour toll-free technical support.

The ZEOS Meridian will support you as you face the daily rat race. It'll not only race with you, but it'll organize each event, tally the results, and even report back to the office—lap by lap. What a way to work—whether you're in the office or speeding around. For a swift notebook that's raring to go 24-hours-a-day, call your ZEOS Systems Consultant today at 800-554-7172.

486 & DX4

Package 1			Package 2			Package 3		
Dual Color	**400C**	**800C**	**Dual Color**	**400C**	**800C**	**Dual Color**	**400C**	**800C**
486DX2-50	$1995	$2295	486DX2-50	$2295	$2495	486DX2-50	CN! $2595	CN! $2795
DX4-100	$2395	$2695	DX4-100	$2695	$2895	DX4-100	CN! $2995	CN! $3195
Active Color	**400A**	**800A**	**Active Color**	**400A**	**800A**	**Active Color**	**400A**	**800A**
486DX2-50	$2695	$3095	486DX2-50	$2995	$3295	486DX2-50	CN! $3295	CN! $3695
DX4-100	$3095	$3495	DX4-100	$3395	$3695	DX4-100	CN! $3695	CN! $3995
➤ 4MB RAM ➤ 175MB IDE hard drive ➤ 800: Internal 3.5" 1.44MB floppy drive ➤ MS-DOS 6.2			➤ 4MB RAM ➤ 260MB IDE hard drive ➤ 3.5" 1.44MB floppy drive, 400: External, 800: Internal ➤ Custom carrying case ➤ MS-DOS 6.2, Windows for Workgroups 3.11 ➤ Lotus Organizer			➤ 8MB RAM ➤ 350MB IDE hard drive ➤ 3.5" 1.44MB floppy drive, 400: External, 800: Internal ➤ Custom carrying case ➤ Extra battery ➤ MS-DOS 6.2, Windows for Workgroups 3.11 ➤ Lotus Organizer		

Pentium

Package 1		Package 2		Package 3	
Dual Color	**850C**	**Dual Color**	**850C**	**Dual Color**	**850C**
Pentium-75	$3495	Pentium-75	$3995	Pentium-75	$4395
Active Color	**850A**	**Active Color**	**850A**	**Active Color**	**850A**
Pentium-75	$4295	Pentium-75	$4795	Pentium-75	$5195
➤ 8MB RAM, 256K synchronous SRAM cache ➤ 528MB IDE hard drive ➤ Internal 3.5" 1.44MB floppy drive ➤ Integrated 16-bit stereo sound ➤ MS-DOS 6.2, Windows for Workgroups 3.11		➤ 16MB RAM, 256K synchronous SRAM cache ➤ 528MB IDE hard drive ➤ Internal 3.5" 1.44MB floppy drive ➤ Integrated 16-bit stereo sound ➤ Custom carrying case ➤ Extra battery ➤ MS-DOS 6.2, Windows for Workgroups 3.11 ➤ Lotus Organizer		➤ 16MB RAM, 256K synchronous SRAM cache ➤ **810MB** IDE hard drive ➤ Internal 3.5" 1.44MB floppy drive ➤ Integrated 16-bit stereo sound ➤ **14.4 PCMCIA fax/modem** ➤ Custom carrying case ➤ Extra battery ➤ MS-DOS 6.2, Windows for Workgroups 3.11 ➤ Lotus Organizer	

Included With Every ZEOS Meridian:

intel inside

- ➤ 400 & 800: Intel® 486DX2-50 or DX4-100 processor. 850: Intel® Pentium-75 processor.
- ➤ RAM expandable to 20MB (850 to 32MB).
- ➤ 400: IDE HDD upgradable to 350MB. 800: IDE HDD upgradable to 528MB. 850: IDE HDD upgradable to 810MB.
- ➤ Local bus video with 1MB video RAM.
- ➤ PCMCIA slots. 400: 2 Type II, 800 & 850: 2 Type II or 1 Type III.
- ➤ Display: Color VGA backlit LCD, up to 256 colors. 400: 640 x 480 7.9" DSTN or active matrix (8.2" monochrome available). 800: 640 x 480 10.3" DSTN or 9.5" active matrix. 850: 10.3" **800 x 600** DSTN or 9.5" 640 x 480 active matrix.
- ➤ Supports an external SVGA color monitor at resolutions up to 1024 x 768.
- ➤ 84-key keyboard with embedded numeric keypad, 12 dedicated function keys and inverted "T" arrow keys. Integrated TruePoint™ pointing device.
- ➤ Ports: Serial, enhanced parallel, external VGA video, external keyboard or PS/2 mouse (800 & 850 both). 400 also with external floppy drive. 850 also with mic-in and stereo speaker-out.
- ➤ Replaceable, rechargeable NiMH battery.
- ➤ Full power management features.
- ➤ AC110-240V to DC adapter.
- ➤ 400C: 7.8" x 10.2" x 1.7"; 3.9 lbs. 800C: 8.9" x 11.7" x 1.9"; 6.3 lbs. 850C: 8.9" x 11.7" x 2.1"; 6.8 lbs.
- ➤ EPA Energy Star compliant.
- ➤ FCC Certified Class B; UL Listed.
- ➤ ZEOS Customer Satisfaction Package.

CN! –We can ship today! Call for details.
Fax Orders: 800-362-1205 or 612-362-1205. Phone Orders: Outside U.S. and Canada: 612-362-1212, Government: 800-245-2449. ZEOS Information Systems, Inc. GSA #GS00K94AGS5176. Purchase Orders, MasterCard, VISA, Am Ex, Discover, COD, Z-Card, & leasing programs.

800-554-7172 **24 Hours a Day 365 Days a Year**

ZEOS INTERNATIONAL LTD

EPA endorsement of any product or service. All products and company names are trademarks or registered trademarks of their respective holders. Intel Inside Logo are trademarks of Intel Corporation. ZEOS is a registered trademark, Z-Card is a servicemark, ZEOS Meridian and MER-PCM-850SA

CIRCLE 151 ON READER SERVICE CARD

Vibrant report covers color prints and comps. Full-bleed tabloid. Front and back. Any paper, vellum to cover. What will you propose next?

High impact business-building overheads. Info-rich report graphics on plain or glossy paper, up to 600 x 300 dpi, up to 4 pages per minute. Desktop option switches paper and transparencies. Get your share of the pie quickly and easily.

Color is color, until you

These are the color printers of Tektronix, the best in the world. For all the colorful things you do in business, graphic arts, science and engineering, there's a Phaser Color Printer that fits your requirements perfectly.

Among these award-winning printers are the Phasers designated Editors' Choice by *PC Magazine*. "All five offerings from the [Tektronix] Phaser line define the state of the art in their respective categories.*" Now four new Phasers raise those standards even higher.

Phaser Color Printers for the Business Office			
Paper size	Letter A/A4	Letter A/A4	Letter A/A4
Media type	Plain paper Glossy paper and transparency	Laser paper Special paper and transparency	Plain office text and cover papers, and transparency
Print time	1-2 minutes/page	2 pages/minute	4 pages/minute
Resolution	360 dpi	600 x 300 dpi or 300 dpi	600 x 300 dpi or 300 dpi
Cost Per Page	Low - Mid	Mid	Low
	NEW Phaser 140	Phaser 220	NEW Phaser 340

© 1995 Tektronix, Inc. All rights reserved. *PC Magazine, Nov. 22, 1994, Annual Printer Review

see the best side by side.

	Phaser Color Printers for the Professions		
Letter A/A4	Flexible 4 x 6 ins. to 12 x 18 ins.	Letter A/A4 Letter extra	Tabloid/B Tabloid extra
Laser paper and transparency	Any paper and transparency	Special paper and transparency	Special paper and transparency
3.5 pages/minute	1-2 minutes/page	2 minutes/page	3 minutes/tab page
600 dpi Continuous tone	300 dpi	300 dpi Continuous tone	300 dpi Continuous tone
Low	Low - Mid	Premium	Premium
NEW Phaser 540	Phaser 300i / III	NEW Phaser 440	Phaser 480

All Phaser Color Printers offer:

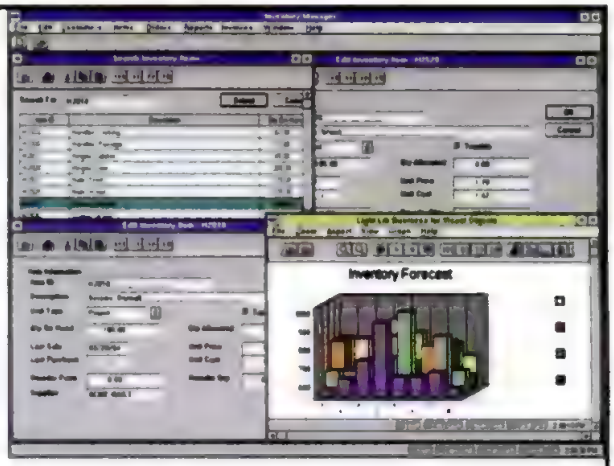
■ 300 dpi or 600 dpi ■ AdobePostScript™ Level 2 ■ Paper prints or transparencies ■ Support for PCs, Macs, workstations and networks ■ Pantone's color certification ■ RISC-speed print processing ■ TekColor™ image enhancement ■ A Tektronix one year warranty ■ Top technical support.

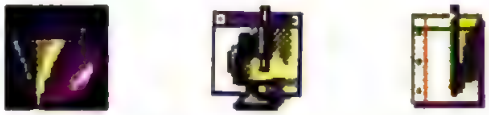
Tektronix

Free output sample and nearest dealer, call 800/835-6100, Ext. 1676.

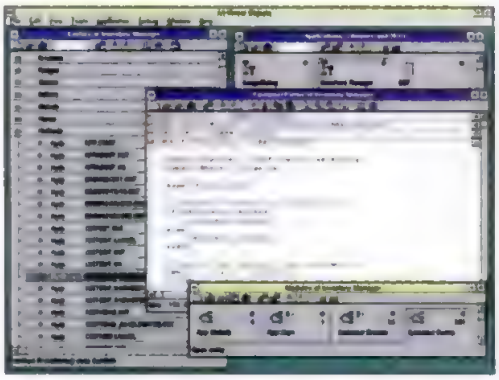
CIRCLE 001 ON READER SERVICE CARD

Highly informative business applications can also be great-looking.





Developers: Bet You Haven't Seen Xbase Like This Before.



It's easy to create Windows applications with browsers and editors that design and manage the process.

With CA-Visual Objects,* developing new applications is a sight to behold. Because for the first time, the ease of use of visual programming has been married with the fourth generation power of an Xbase language.

The result is the only application development tool that gives you full object orientation, GUI support and client/server architectures combined with existing Xbase technologies and databases.

And the advanced technology of Visual Objects doesn't stop there. The object orientation includes inheritance, polymorphism and encapsulation. And the native code compiler boasts an engine that drives Visual Objects at a speed that's as fast as lightning. Plus, the repository-based interactive development environment includes class browsers, painters, editors and prebuilt classes.

Mission-Critical
Client/Server
Repository-based
Native Code Compiler
Fully Scalable
Class Libraries
OOP

For More Information, Call 1-800-225-5224, Dept. 14007.

Phone soon for a closer look at new CA-Visual Objects. Your mind won't believe what your eyes are seeing.

New CA-Visual Objects®

COMPUTER ASSOCIATES
Software superior by design.

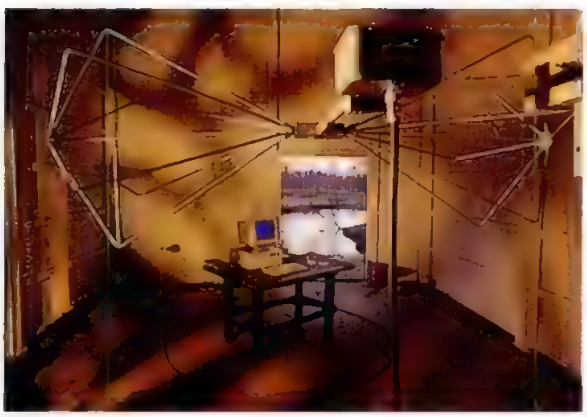
* Computer Associates International, Inc., Islandia, NY 11788-7000. "Light Lib" graphic developed in conjunction with Light Lib Business for Windows from DFL Software, Inc. All products referenced herein are trademarks of their respective companies.

CIRCLE 400 ON READER SERVICE CARD

Building PCs in Less Time

New FCC rules will speed PCs to market.

How can a six-hour test cripple a product launch? Every year, inside a converted barn at Rockford Engineering Services, hundreds of the latest PCs undergo a six-hour test for radio emissions before they can be certified by the Federal Communications Commission and sold to the public. Under the existing procedure, once products pass the test at an independent lab such as Rockford Engineering in St. Leonard, Maryland, applications go to the FCC, which then takes four to six weeks to grant certification.



Proposed changes in the FCC-certification procedure, including radio-emissions tests, could shave six weeks off the process.

With product life cycles that are often as short as six months, a month-long delay for processing FCC applications represents a significant portion of the market life for PCs. "It could take six weeks and $70,000 to get six products approved," says Brent Alexander of Rockford, which does compliance testing for Acer, Logitech, Micron, and several motherboard manufacturers. "What small vendor can afford that?"

Since manufacturers find the certification process time-consuming and expensive, the FCC has proposed some changes that would streamline compliance, making it easier and faster for manufactuers to get PCs and peripherals onto the market.

Under the new proposed rules, the testing labs could immediately certify the products. "Even the small guys will be able to get hot products out right away," says Alexander. The emissions tests ensure that the radio noise generated by PCs and peripherals is "quiet" enough not to interfere with radio signals from police, ambulance, and fire communications, radio and television broadcasting, and air traffic control.

The new rules would also allow the certification of individual components—the chassis, power supply, and motherboard—so that vendors can mix and match preapproved components. Under existing rules, every configuration must be approved, which means testing fees add up quickly.

In Europe, manufacturers are already permitted to self-declare compliance with radio-noise standards. For many manufacturers, the next step would be one set of worldwide standards for interference, emissions, and power consumption. They say it would be easier to build a PC to the toughest spec than to build to multiple specs.—*Carol Levin*

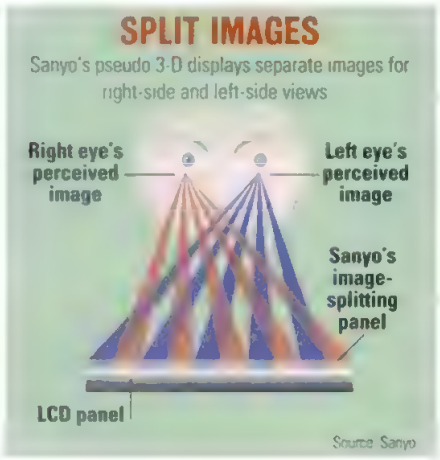
Photos by Chris Uscher

Looks Like 3-D, No Glasses Required

BACK IN THE 1950s, THERE WERE 3-D movies. A few years ago, 3-D greeting cards and posters became the rage. Now, Sanyo has developed a series of low-cost pseudo 3-D display systems that don't require custom 3-D glasses and come in 4-inch, 6-inch, and 10-inch display sizes. The displays are thin-film transistor (TFT) LCDs, which keeps the cost down and means they can be small enough to be integrated into consumer electronics products.

To simulate a 3-D image, Sanyo developed an image-splitter panel that separates images into right-side and left-side views. When the panel is at the right distance from the underlying pixels on an LCD panel, the pixels from one image are directed to the left eye and the pixels from a different image are directed to the right eye. To view a conventional 2-D image, you simply flip a switch. Video also appears to have three dimensions when viewed through the image-splitting panel.

The pseudo-3-D technology has not made its way into products yet, but it will by the end of this year, Sanyo says. The technology is targeted first for consumer electronics products such as videophones, personal game units, car navigation systems, and television. Later, it will be showing up in 3-D simulation systems for schools, hospitals, and museums.
—*Sebastian Rupley*



Pipeline *By Robin Raskin*

Bugs in Your Bonnets

An open letter to the general press and anyone else who expects perfection in computers.

Seems like it's politically corrrect to be a bug-basher these days. What with the Pentium floating-point bug (December 1994), the Disney *Lion King* problem (January 1995), the Intuit tax mess (March 1995), and the H&R Block TaxCut mess, the press has become vigilant in its quest to expose bugs. (I find myself scouring the pages of *The Wall Street Journal* for the latest bug reports. . . .Who woulda thunk it?) The press has even become influential in assessing proper remunerations for their readers.

I have to believe that it's the pressure of "bad ink" that helped

Intel decide to replace defective Pentium chips at no cost to users. It helped Intuit decide to pay any IRS penalties derived from bugs in its products. (Disney and H&R Block have been less contrite.) While the press should be applauded for disseminating timely bug information, you have to wonder whether it's ultimately fueling a false sense of expectations about computer software.

The press appears to have lost sight of the fact that bugs have a longstanding tradition in our industry. Bugs are not new, and they will never go away. As a matter of fact, software products are more stable than ever before. The press seems fixated on the consumer market, where readers—after having spent $2,500 on a PC and $50 on the promise of a software "experience"—can become apoplectic about the possibility of a bug. Bugs like those in Lotus Organizer or Word 6.0 that can cripple an entire organization tend to go unreported.

It's time to move beyond bellyaching about bugs and start influencing change—the most important of which is a change in attitude. Here are some worthwhile attitude adjustments.

For Users: Bugs are part and parcel of computing. Get used to it. Think of computing as you think about the birth of a child: It's so complicated that it's truly amazing that anything goes right. Don't be shy about calling tech support, but be able to supply basic information, including your configuration and what you did that led you to the bug. If they try to stick you with a tech support charge for reporting a bug, scream bloody murder and call the press!

For Vendors: Instill a zero-defects mentality in your staff. You can't afford not to, even if it's at the expense of adding that next hot feature. Make it easy for your customers to report bugs, and don't ever doubt your customers. They're always right. Build software with bug-fixing in mind. There are well-known techniques such as moving routines that have high-bug potential to Dynamic Link Libraries (DLLs), which are easier to replace than entire applications. Prepare for large beta tests. Fix bugs immediately, not in the next release.

Most difficult, but most important: There's got to be a change in perceptions. Unearthing a bug needs to be seen as a good deed, a cause for celebration and reward. If users find "reasonable and reproducible" bugs, they've helped you. Reward them. Give them their money back. Give them a free lifetime subscription. Give them anything, but let them know they've done you a favor. Finally, call the press immediately if you do have a bug. It'll be worse if they think they've caught you playing ostrich.

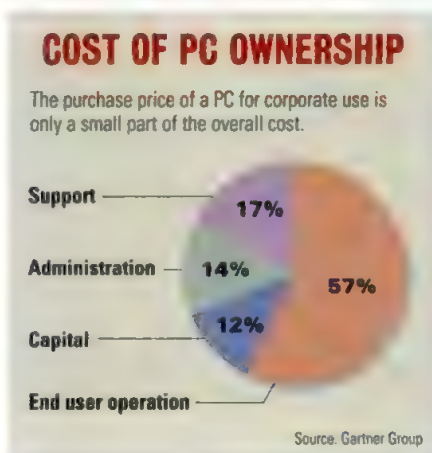
Robin Raskin is the editor of PC Magazine.

Pay Now—or You'll Pay Later

EIGHT YEARS AGO, THE COST OF owning a PC for corporate use for five years was about $19,000. Today, it's more than $40,000, according to estimates by the Gartner Group. To lower the long-term cost of PC ownership, manufacturers are designing PCs with new features aimed to minimize downtime and improve management.

Technical support, training, inventory, upgrades, downtime, and data loss account for four-fifths of the cost of PC ownership over a five-year period, according to the research. "Buyers haven't paid enough attention to maintaining PCs once they belong to the organization," says William Kirwin, an analyst at the Gartner Group. "In the past couple of years, companies have been looking for ways to lower the cost of PC ownership."

Compaq, Hewlett-Packard, IBM, and other PC makers are all trumpeting manageability. Compaq, for instance, is overhauling its entire Deskpro line with an emphasis on lowering the long-term cost of ownership. The high-end machines will have "intelligent manageability" features for asset control, fault management, and security. Compaq has teamed with disk-drive makers Conner, Quantum, and Seagate on "IntelliSafe" hard disks, which monitor drives and provide pre-failure notification. In the initial implementation, the hard disk warns of problems on boot-up. In the Windows 95 implementation, remote management agents will allow network administrators to respond to predicted problems. If a failure does occur on a client's hard disk, a network agent can initiate tape backup. Explains Andrew Watson, director of desktop marketing at Compaq, "We're adding a little bit of cost to the product, but in the long run, it really saves a lot of money."



PC buyers also want help managing their total system investment. According to a recent Louis Harris poll on satisfaction with PC service and support, commissioned by Dell Computer, vendors fail to take responsibility for customer satisfaction over the lifetime of products. "Customers want vendors to deal with the notebooks they're replacing, transfer software to the new machines, install network adapters and software at the factory, and even preinstall custom applications. Customers want suppliers to help them anticipate changes in technology, providing 18-month technology roadmaps," says Michael Dell, CEO of Dell Computer.

—Carol Levin and Melissa Perenson

Wavelet-Compressed, Ultra-Tiny Files

TO HELP SOLVE THE PROBLEM OF file obesity, the Houston Advanced Research Center (HARC), a university-linked organization focusing on research in information systems, energy, the environment, and biotechnology, has developed compression software called HARC-C, which puts a new spin on traditional ways to squish data.

"We've demonstrated video at 38 frames per second at 640-by-480 resolution and 16-bit color on a 486 notebook with 4MB of memory. No one else can do that in software," says Andrew Blanchard, director of the Strategic Technology Applications Research Center at HARC. As with any compression technology, the trick is to reduce nonessential information without sacrificing image quality.

HARC-C is based on *wavelet image compression,* a technique that describes data in terms of its frequency, energy, and timing, and "remembers" certain attributes of an image. "Once we have an attribute and a location, we have a very efficient way of describing an image," says Blanchard. According to HARC, the algorithm typically compresses images at a ratio of 300:1, which reduces a 2.4MB file to 8K. The best effort to date is 450:1 without noticeable quality degradation or artifacts.

The original image (left) was compressed with HARC-C at 300:1 with minimal degradation (right).

Other compression techniques, such as JPEG and MPEG, use *discrete cosine transform,* which has difficulty remembering attribute locations and requires a special encoding process to recover that information. "Some of the other compression techniques throw away critical information in order to get compression ratios that are reasonable. That's why you see the images degrade," says Blanchard. And while other compression technologies are single-purpose, HARC-C works on still images, video, sound, and text. It's also able to split big images into segments and feed individual "tiles" to different processors. A mathematical technique called *boundary-spline-wavelet* then stitches the image back together.

While the technological hurdle was getting HARC-C to work in software while maintaining image quality, the next challenge is to get it into desktop applications. For now, HARC is working with vertical markets such as satellite imagery, telepatholoy, and teleradiology, and it is also talking with business partners about building it into CD-ROMs. —*Carol Levin*

Digital Visionaries

GREG BLONDER, DIRECTOR OF THE Human-Centered Engineering Research Lab at Bell Laboratories in Murray Hill, New Jersey, is investigating what people want to do with computers in the future. He believes that lack of innovation is stalling the PC industry, and has some interesting ideas about what's needed to jump start it. His theory of "dominant design" raises a warning flag: No one is innovating; they're just imitating.

Bell Labs' Greg Blonder

PC Magazine: *Where will the next big breakthroughs in computing come from?*

Greg Blonder: Because of the "groupthink" that goes on in the PC industry, real innovation is going to come from a different industry or from some other platform. It could come from television, Hollywood, the communications industry, or from somewhere entirely unexpected. The innovation driver may be a product or service for constant two-way communications. Wireless technology might make a difference in what the operating system ought to be. When you talk about portable devices with communications, that's not at all like DOS or Windows. It's about lightweight systems with an entirely different view of what matters. That could be it.

PCM: *What will computers look like in the future?*

G.B.: Computers are going to make fundamental changes in our behavior, but we won't think of them as computers because they'll be invisible. These hidden computers will provide experts' advice and projections about the future, something computers are getting very good at now. You might be an architect licensed in New Jersey, and you get a contract to build a house in New York. The expert system will tell you the changes you have to make in order to meet all the zoning codes in New York. It's an absolutely predictive problem that a computer can handle very well.

PCM: *Will on-line services continue to grow rapidly?*

G.B.: Despite all the hype, there are no more than 5 million people who use the Internet or on-line services in a robust way on a daily basis. What are the other millions of households going to do with this capability? People have always done more or less the same things except in different venues. As more users got involved, they've completely warped the Internet so that it's now a communications medium. It's a sign that people mold computers in their own image rather than the other way around.

PCM: *Why do you think that innovation is stalling in the PC industry?*

G.B.: Surprisingly, one of the reasons why computers aren't innovative is because the marketplace for computers has perfect communication between all the users.

The Japanese came up with a different way of building cars because they were 10,000 miles away from Detroit. They had a different environment around them, and it forced them to do things differently. But the computer industry is on the opposite side of the spectrum. It sounds silly to say that perfect communication is bad, but I genuinely think that's why there's such a paucity of innovation. What happens is that oddball software hardly ever gets a chance to get a foothold. There used to be a difference between DOS and Apple, which gave people a reason to choose. Then Microsoft copied the design, made Windows dominant, and now there's no choice. Dominant designs aren't always efficient. They often arise through the happenstance of history. It's very difficult to displace the dominant design.—*Carol Levin*

Folio's On-Line Business Library

FOLIO CORP., A DIVISION OF THE publishing giant Reed Elsevier, is building a global open model for anybody who wants to bring business documents and publications on-line. By joining with partners who provide metering, security, electronic copyright, and global networks, Folio's Information Marketplace is targeted as a full-service clearing house to keep corporations from worrying about sticky issues surrounding business publishing on-line. Several key partners, including AT&T, Novell, and Powersoft are betting that Folio's strategy is more than just another late entry in the electronic publishing race.

The crucial links in Folio's strategy are its "InfoApps" and "Infobases," both of which leverage Folio's sophisticated electronic publishing and text-retrieval software. Using InfoApp toolkits from Folio (Novell and PowerSoft are partners working on the toolkits), corporate developers are expected to build customized, highly searchable, metering-enabled documents and publications to sell on-line via wide area networks (see diagram). Through built-in metering, InfoApp builders will accrue a percentage of the transaction fee (as will Folio) each time an electronic document is accessed.

AT&T is in partnership with Folio to provide the global network infrastructure, and several large corporations interested in publishing via Folio's model have already signed on to put their corporate libraries on-line via Folio's InfoApps. Publishers can also create simple Infobases, which are basic electronic documents that take advantage of Folio's powerful text-retrieval tools, and then post the documents on the World-Wide Web, via Folio's Infobase Web Server.

If Folio's strategy sounds complicated, it is. Putting corporate libraries on-line may take time, and in the interim, much of the information marketplace's content will come from on-line print publications. This puts Folio in direct competition with experienced players including Dow Jones, GEnie, Information Access, and the commercial on-line services. It also puts Folio in competition with Notes, which is widely used to make corporate libraries electronic. Folio's strategy, however, may have two major advantages over other models for publishing on-line.

For one, Folio's graphical front-end tools are much more advanced than much of what is in use on-line today, and key players such as Novell and PowerSoft are working to make them more powerful. For example, Dow Jones allows you to scour business publications such as *The Wall Street Journal* for selected business information and perform simple searches. But Folio's InfoApps and Infobases transform electronic documents into text databases, allowing for very advanced searching and sorting.

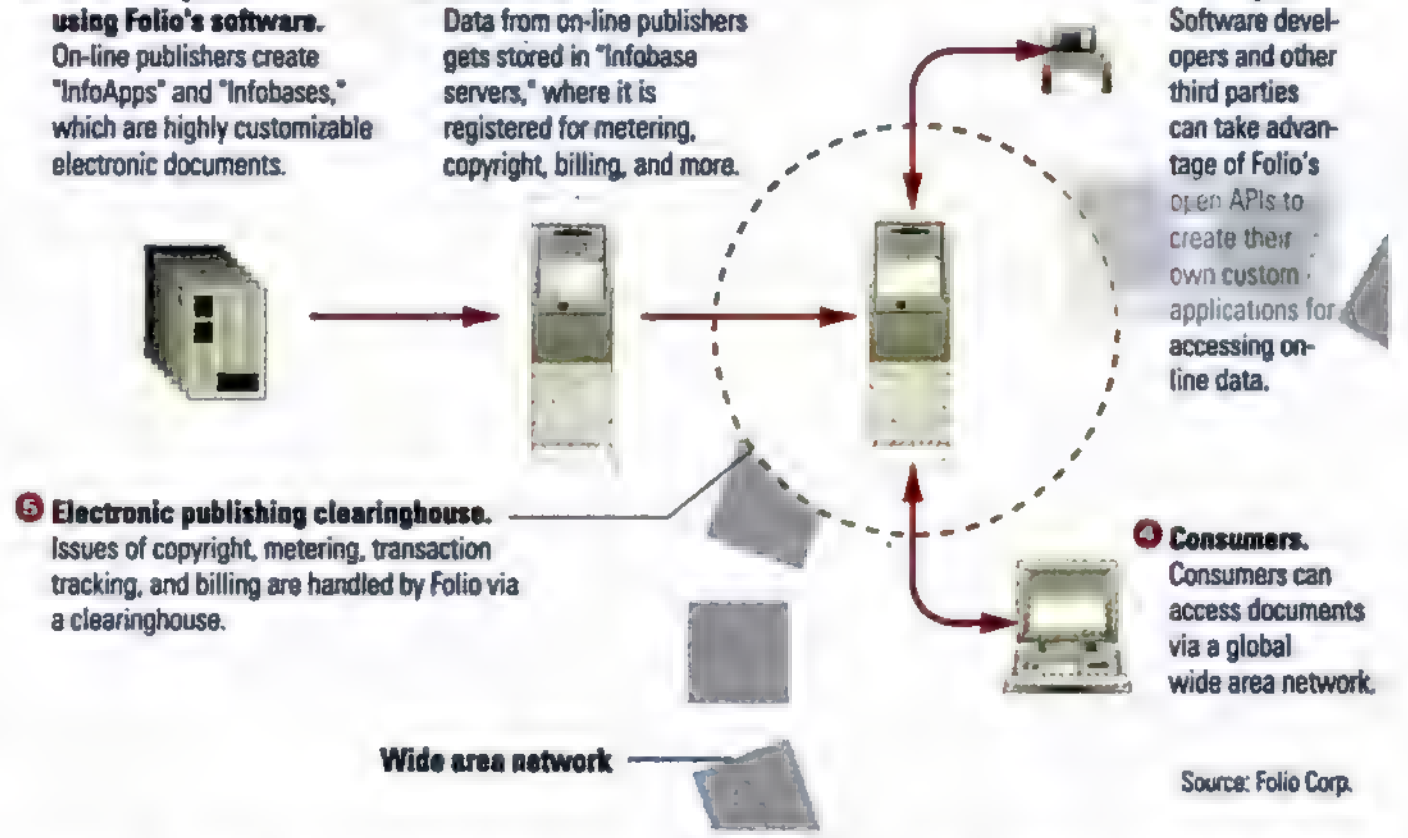
A second possible advantage to Folio's Information Marketplace could be the sheer amount of content already in place. Reed Elsevier's Lexis-Nexis legal/business database is now Folio's sister company and will put all its documents on-line in InfoApp format. All of Reed Elsevier's publishing operations, including Cahners', will too. The Copyright Clearance Center, which handles electronic copyright issues for 5,000 existing corporate publishers, will put all its electronic documents on-line in InfoApp format. And Folio has several thousand existing publishers of its Infobases.

Even if Folio is slow to get corporations to publish InfoApps and Infobases, the volume of existing content is considerable. According to Dow Jones, graphical front ends to compete with Folio's are in the works. Dow Jones is also working to make its Personal Journal interface, a Windows front end for searching *The Wall Street Journal*, into a graphical front end for all of its business information. The company expects to extend the Personal Journal interface later this year to all Dow Jones content, which includes 1,800 business publications. Information Access offers its Business Database+ service, which includes several thousand on-line magazines.

—*Sebastian Rupley*

THE INFORMATION MARKETPLACE

Folio's strategy is an open model for publishing corporate libraries and business periodicals. Documents in InfoApp and Infobase format are offered for sale via wide area networks, including the Internet.

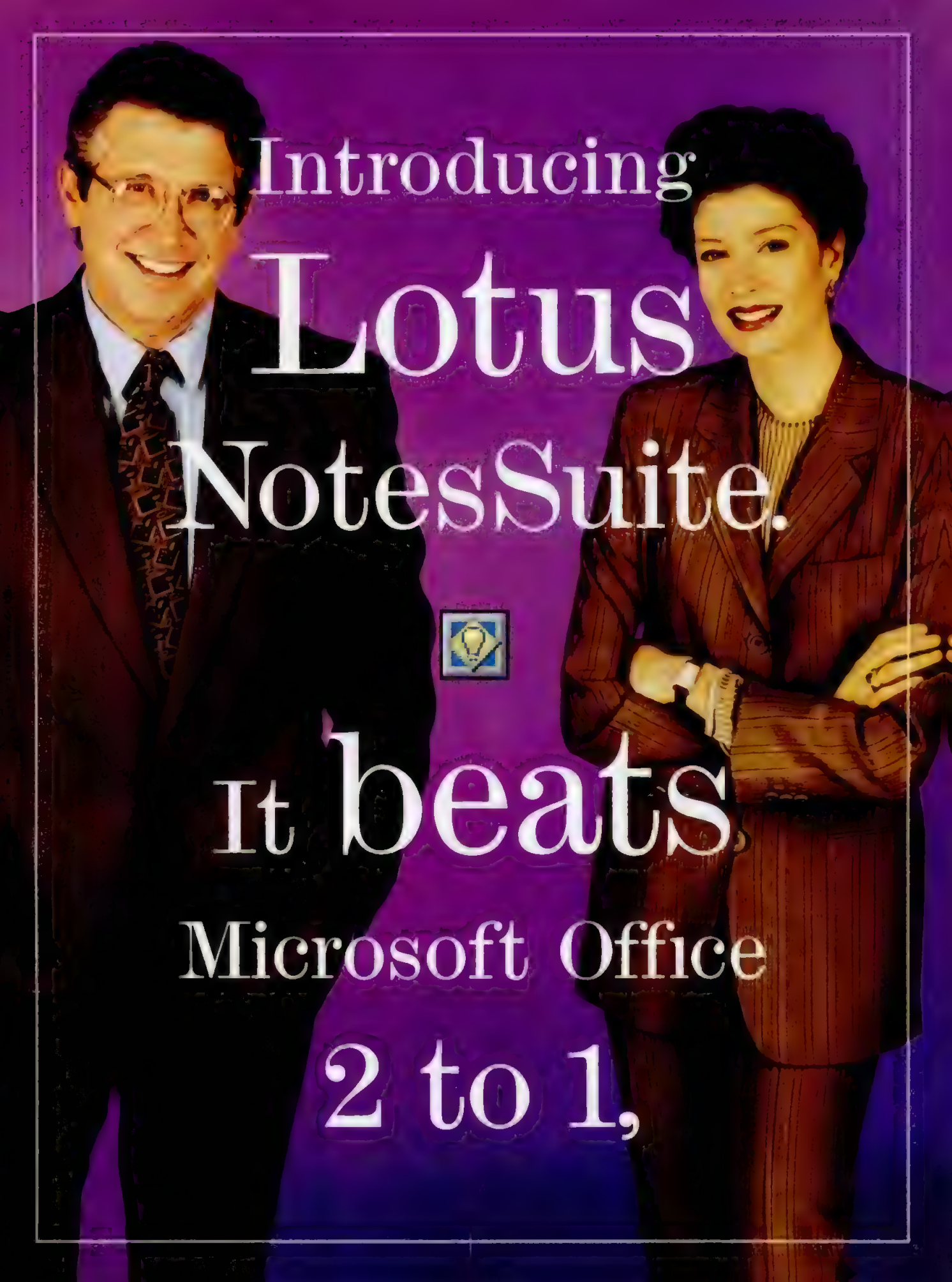


Source: Folio Corp.

Top Retail Software

Current ranking	Last issue	Product/ company
1	7	**MS-DOS 6.22 Upgrade** *Microsoft Corp.*
2	1	**Turbo Tax Federal 1994 Final Edition** *Intuit*
3	—	**QEMM 7.5** *Quaterdeck Office Systems*
4	—	**WinCheckIt 2.0** *Touchstone Software*
5	3	**Procomm Plus for Windows 2.1** *Datastorm*
6	4	**WordPerfect 6.1 for Windows Upgrade** *Novell*
7	—	**Delphi 1.0** *Borland International*
8	6	**Uninstaller 2.0** *MicroHelp*
9	—	**MS Windows 3.11** *Microsoft Corp.*
10	—	**WordPerfect 6.1 for Windows** *Novell*

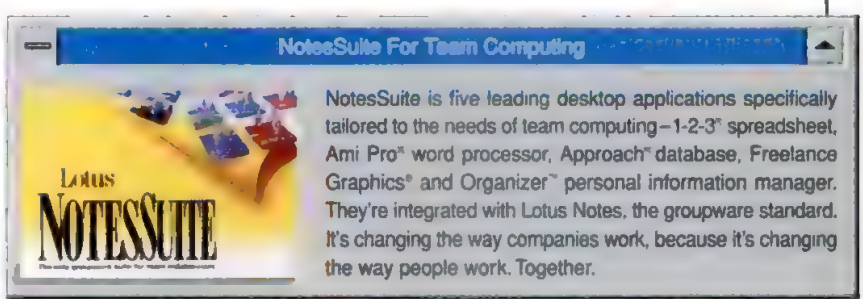
This list ranks PC business programs according to the total number of copies shipped to over 12,000 stores and resellers in the week ending March 4, 1995; the list cannot be interpreted as a picture of the entire software market. Adapted from a compilation by Ingram Micro.


Introducing
Lotus
NotesSuite.
It beats
Microsoft Office
2 to 1.

Not to mention
10 to 1,
27 to 1, and
1282 to 1.

We have nothing against Microsoft® Office. And, if you're an individual who works alone, then you probably have nothing against it either.

However (and it's a big however), if you think the most productive way of working is by communicating, collaborating and sharing information with other people, you need the only business solution created to make teams more productive.



INTRODUCING LOTUS® NOTESSUITE,™ the powerful new combination of SmartSuite,® our five leading business software applications for the desktop, integrated with Lotus Notes,® the groupware standard that helps everyone communicate across the enterprise and around the world. The applications in NotesSuite are optimized for the computing needs of teams whether it be a team of two, of 1282, or even more.

WITH THE TEAM COMPUTING BENEFITS OF NOTESSUITE YOU WILL FULLY REALIZE THE POTENTIAL OF YOUR PEOPLE. Everyone, at every level, will be a contributor, a collaborator, a true colleague. Imagine, for example, being able to expedite the budget process by having all parties work on the same spreadsheet simultaneously. Or being able to create a database filled with new product information, sales presentations and customer profiles that can be accessed remotely and updated continuously by members of a sales team no matter where they happen to be. People and groups of people will feel empowered. Because, for the first time, they are empowered.

Lotus NotesSuite is helping successful companies become more competitive. Put NotesSuite to work for your company today, for as little as $299.† For free trial versions of all the Lotus products, just call 1-800-TRADE-UP, EXT. A710* for the new Lotus Product Gallery CD.

Lotus
Working Together®

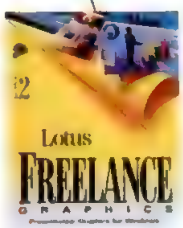
*In Canada call 1-800-GO-LOTUS. †$299 per user license for Lotus NotesSuite Desktop. Minimum purchase of fifty licenses required. ††Source: "Lotus Notes: Agent of Change," International Data Corporation, 1994. The World Wide Web address: http://www.lotus.com. ©1995 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. All rights reserved. Lotus, Working Together, Lotus Notes, SmartSuite, 1-2-3, Ami Pro, Approach and Freelance Graphics are registered trademarks and NotesSuite, Organizer and Notes/FX are trademarks of Lotus Development Corporation. Microsoft is a registered trademark of Microsoft Corporation.

The only groupware suite for team collaboration.

Coordinating budgets has never been faster or easier. Because, with NotesSuite, you can share 1-2-3 spreadsheet information with colleagues working on the same budget at the same time – no matter where they're located thanks to Notes/FX™ 1.1.

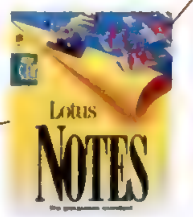
Create a database in Approach to track sales and inventory, manage projects and contracts, and analyze and report on data. And everyone on your team will have instant access to what's going on.

Reduce paperwork and automate work flow by creating a report in Ami Pro using information stored in your 1-2-3 spreadsheet. Route it for approval automatically and track progress with your Notes application.



Use Freelance Graphics to develop presentation materials for discussions or sales meetings. Then store them in a Notes database, so that everyone can access them anywhere or anytime.

Lotus Organizer with group scheduling makes it fast and easy to set up meetings with anyone on your LAN or WAN. It gives you real-time access to your team members' schedules, so you can instantly see who's available and when.



Lotus Notes is the groupware standard that lets people share and access information and ideas across teams, across companies, around the world. This new level of communication and collaboration has proven so effective, companies using Lotus Notes have averaged nearly 200% annual return on investment.††

NotesSuite is the only integrated suite of products for group collaboration. With NotesSuite, information can be shared seamlessly between Lotus Notes and all five Lotus desktop applications, giving you an efficient new way to store, organize, share and collaborate across the organization. And, NotesSuite comes with 10 built-in applications you can use as is, or customize, to take advantage of the unique integration between Lotus Notes and SmartSuite. So put NotesSuite to work for your company today, for as little as $299.† For free trial versions of all the Lotus products, just call 1-800-TRADE-UP, EXT. A710* for the new Lotus Product Gallery CD.

Lotus
Working Together®

SOFTWARE SPECTRUM
800-824-3323

Softmart
800-835-3725

CORPORATE SOFTWARE
800-718-4749

ASAP
800-248-ASAP

First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

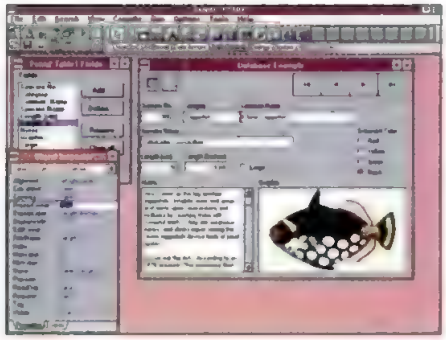
APPLICATIONS DEVELOPMENT

Delphi Combines Visual Programming With Fast Native-Code Compiler

By Neil Rubenking

Borland, with the introduction of its Delphi applications development environment, returns to its roots of Pascal programming—but with a big difference. The latest arrival in the component-based visual programming field, Delphi is an alternative to Microsoft's Visual Basic or PowerSoft's PowerBuilder that lets you quickly design prototype Windows applications and provides all the resources you'll need to create the full-fledged production version.

Delphi comes in two flavors: Desktop Edition ($499) and Client/Server Edition ($1,999). The desktop product contains a full complement of components and includes support for local database access and reporting. The Client/Server program adds tools for advanced network database development and an interface for supervising team development of a project. Delphi's database support is fully scalable, so switching from local to client/server can be as simple as changing a database alias.



LIVE FISH: *Delphi allows the use of live data at design time, which is immensely helpful.*

DEEP-DOWN PASCAL

Programming in Delphi starts with form design. There, you place components on a form, setting properties (like color, caption, and font), and adding functionality by attaching program code to events (such as OnClick, OnMouseDown, and OnChange). Delphi then creates a code unit that defines an object corresponding to the form. The object comes complete with data fields for each component, and automatically builds a method header for each event handler you add.

The programming language below the surface of Delphi is a version of Borland's Object Pascal. Up to date in all ways, Delphi includes enhancements like a new object model, integrated debugging, built-in exception handling, and runtime type information. Compatibility with Borland Pascal 7 is maintained, though mixing old and new object models in the same program caused occasional problems.

The Delphi compiler rapidly generates native machine-code .EXE programs and provides access to almost every area of Win-

Continues on page 38

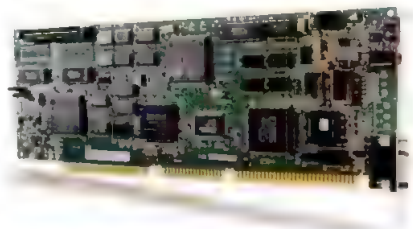
VIDEO

Two MPEG Decoders: Desktop Video Evolves to the Next Level

By Jan Ozer

Jazz Multimedia's Jakarta and Sigma Design's RealMagic RAVE prove that as hardware MPEG playback of video heads toward the mainstream PC user, all graphics and video cards are not created equal. The $449 Jakarta aims high and delivers, setting new standards in video performance, expandability, and value. At $489, RAVE is an able extension to Sigma's RealMagic line, providing stable performance and support for several MPEG formats.

Both cards represent a significant step forward for the state of hardware MPEG playback and offer an inexpensive glimpse at the future of video, graphics, and multimedia. MPEG (Motion Pictures Experts Group) decompression is the predominant video compression technology today; it delivers 30 frame per second video, produces a native resolution of 352-by-240, and provides higher full-screen quality than most software compression technologies (for example, Indeo or Cinepak).



OVER AND UNDER: *Based on overlay technology, the RAVE board combines graphics and video for display.*

MPEG typically requires dedicated hardware to decode the image during playback. The Jakarta and RAVE boards, which combine graphics and video, offer different approaches to getting the video onto the screen.

THE GRAPHIC DETAILS

The Jakarta board, which is available in both PCI and VL-Bus configurations, uses a shared frame buffer architecture that integrates MPEG playback and graphics functions onto a single card. The design uses the Tseng Labs ET4000/W32p graphics engine, the Zoran ZR36100 MPEG decoder, a Viper video coprocessor, and 2MB of DRAM. This allows the Jakarta to handle true-color 24-bit MPEG playback at 800-by-600 resolution with a monitor refresh rate of 110 Hz, or 256 color depth at up to 1,280-by-1,024 resolution and 75 Hz.

In contrast to Jakarta's shared frame buffer, the RAVE uses an overlay design that keeps the MPEG and graphics components separate until the MPEG data stream is color keyed over the VGA signal during display. The board uses the Trident Microsystems TGU19440AG 32-bit

Continues on page 39

IN FIRST LOOKS

Toshiba Satellite Pro 2150CDT..40
Sharp Zaurus ZR-5000 40
HSC Interactive 2.0.....40
Diamond Stealth 64 Pro Video VRAM 40
Micrografx ABC FlowCharter 4.0.....44
Intergraph Transcend 1.0.....46
MetaStock for Windows.....48
VocalTec Internet Phone.....48
Hewlett-Packard ScanJet 3c ..50
UMAX PageOffice.....51
Visioneer PaperPort 2.0.....51
Adaptiv PeopleScheduler Plus 52
SPI WindowBASE 2.0 52
Peachtree First Accounting.....54
FedEx Ship 1.0.....54
NamePro 1.01 for Windows.....56
PCS EZ-Menu 6.0.....56
InfoSeek Search.....56

Borland Delphi

Continued from page 37

dows programming. The one exception is that you can't use Delphi to get into extremely low-level tasks such as writing VxDs (virtual device drivers).

What you can do is create DLLs, call any Windows API function, respond to any Windows message, and write Delphi components in Delphi. Any design element you see in Delphi is available for use in your own programs.

TWO-WAY TOOL

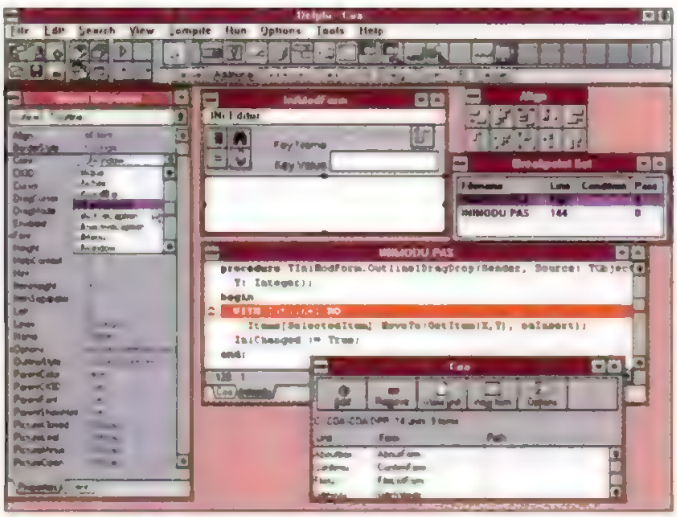
The program allows you to switch easily between visual and text programming. For example, if you cut a component from the form and paste it into the code editor, you'll get a text description of the component. We found that if we changed the properties of the component or even altered the component to a different type, and cut the text and pasted it back into the form, Delphi was able to automatically update the object.

Editing a Delphi form resource file as text is as simple as loading it into the program's code editor. Delphi handles the conversion.

Delphi components provide access to all of the standard Windows controls such as list boxes, memo boxes, and menus, plus a number of common but nonstandard controls such as spin buttons and outlines. Even the standard components get new abilities under Delphi. For example, many components, including the list box, memo box, and image components, can load and save their data in disk files.

Advanced components include bitmapped buttons, speed buttons, two different varieties of tabbed notebook, two types of grid, and a media player component that plays sound files, movies, and CD audio with ease.

Delphi's DDE (Dynamic Data Exchange) components simplify the often thorny issue of exchanging data via DDE, whether from the client or server side. The OLE-container component permits creation of OLE client applications. There's no built-in support for OLE server applications in Delphi at this time, however; expect full OLE support at the client and server levels in the next release of the package.

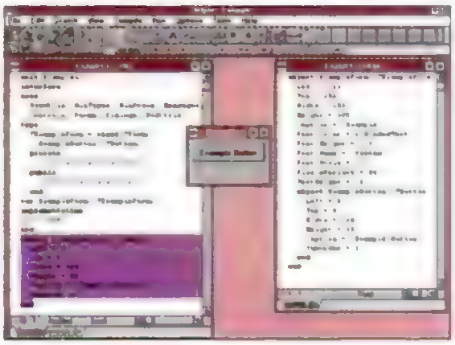


PLACE AND RUN: *Program design in Delphi involves placing components on forms, setting their properties, and writing code to respond to events.*

The database components are divided into two groups: data access components and data controls. The former are invisible components that represent databases, tables, SQL queries, reports, stored procedures, and so forth.

Creating a master/detail relationship between two tables doesn't require any program code, and you can work with live data at design time. Delphi's DataSet Designer lets you set properties individually for a table's fields. For example, you can set a display mask for numbers, or set a field to read-only, and even define calculated fields.

For viewing and editing this data, Delphi supplies data-aware versions of most common components, including edit box, memo box, image, and grid. We were able to connect the program's data-aware grid and the database navigator to the same table component, which created an instant database viewer.



CODE COPIER: *On the right is the code for the window at center; on the left is the code produced by pasting it into the code editor.*

DELPHI VERSUS THE WORLD

Clearly Delphi is going up head-to-head with Microsoft's Visual Basic and PowerSoft's PowerBuilder, both of which have strong followings. Just what would it take to convince a loyal user of either of these applications environments to defect to Delphi?

A big inducement is Delphi's super-speedy compiler, which generates native machine code rather than interpreted code. The result is that Delphi programs should execute faster. And because the resulting programs don't depend on a runtime DLL or on other supporting files, they avoid such problems as the version incompatibilities that can arise with VBX components. On the other hand, since each Delphi program is self-contained and has all the code for the components it uses, a Delphi executable file will be substantially larger than a comparable Visual Basic executable file.

Your investment in VBX controls isn't wasted if you switch to Delphi, because any VBX 1.0 control should work with Delphi. Of course, if your Delphi programs rely on VBX controls, you have to distribute the necessary VBX files with them.

In Delphi, the step from using components to writing components is evolutionary, not revolutionary. You don't have to learn how to program in C or C++, as you would if you wanted to write VBX controls. And your new component can inherit all the functionality of the existing component that comes closest to satisfying your needs.

GROUP DYNAMIC

Delphi fits into a group environment, as well. The client/server version contains full work-group support, including the interface for Intersolv's PVCS Version Manager 5.1. You get the expected team programming features that track successive versions of a project, and a system that lets programmers check out a section of code for work, thus blocking others from changing it until it is checked back in. The result is the orderly development of an application regardless of whether 2or 20 are writing it.

Currently, Delphi is based on a 16-bit compiler, but its programs are compatible with Microsoft's Windows 95 beta and Windows NT operating systems. A 32-bit version of Delphi is scheduled to appear after the release of Windows 95. Converting your Delphi programs to 32-bit should be simply a matter of recompiling them with the new version.

Whether you're a beginner at Windows programming or a long-time expert, Delphi has a lot to offer for start-to-finish development of applications.

Delphi. *List price: Desktop Edition, $495 ($199.95 through May 31); Client/Server Edition, $1,999. Requires: 6MB RAM, 30MB hard disk space, Microsoft Windows 3.1 or later, CD-ROM drive. Borland International, Scotts Valley, CA; 800-891-2223, 408-431-1000; fax, 800-408-0001.*

Circle 434 on reader service card

MPEG Video Boards

Continued from page 37

graphics accelerator, C-Cube's CL450MPEG decoder, and Sigma's own WM7010A video scaler, and can display up to 128,000 colors in all video modes.

Available only for VL-Bus computers, the RAVE comes in both 1 MB and 2MB DRAM configurations; a PCI version will be released by the time you read this. The 2MB board produces color depths and resolutions similar to those of the Jakarta but at lower scan rates: 56 Hz at 800-by-600 (24-bit operation) and 60 Hz at 1,280-by-1,024 (256 colors). Some annoying flicker was noticeable at the higher resolutions.

CHOICES, CHOICES: *The Jakarta offers video on a wide variety of playback platforms.*

Head to head, the Jakarta bested the RAVE in our PC graphics tests, but the differences were marginal at best. Based on 32-bit architecture, neither board will challenge 64-bit or 128-bit cards in pure graphics performance, especially at higher video resolutions. Both are more than adequate for everyday word processing use, spreadsheet use, and the like; both put video on the desktop.

CUT TO THE VIDEO

MPEG playback quality of these two boards was roughly comparable at MPEG's native 352-by-240 resolution. During full-screen playback, Tseng's Viper accelerator/ scaler hardware on the Jazz Jakarta system set itself apart from the RAVE board. The Jakarta produced clear, smooth video irrespective of resolution or aspect ratio. Next to the Jakarta, the RAVE's video often looked pixelated and mottled.

The Jakarta board also has greater reach, because it is able to work with DCI-compliant software codecs—such as Indeo and Cinepak—in both Video for Windows and QuickTime for Windows formats. Thus, you can accurately scale video to full screen with little performance or appearance degradation. RAVE's scaling hardware, by contrast, works only with MPEG files.

In terms of MPEG compatibility, however, RAVE can claim the advantage. Where Jakarta plays only White Book Video CD files with the .MPG extension, RAVE is compatible with White Book, Green Book (CD-i), and Karaoke and Video CD files with the .DAT extension. As PC-based MPEG support grows, we expect that many popular CD-i and Karaoke titles will be rereleased in MPEG format, making this difference less relevant.

Of the two video boards, the Jakarta was slightly easier to install and get running. The board requires only one interrupt, but it must be interrupt number 9, regardless of what may already be using this interrupt. Jakarta's AnyView graphics utilities package, which is licensed from Binar Graphics, offers an impressive array of creature comforts such as on-the-fly mode switching, color and pixel calibration, a display power management system, a virtual desktop, and mode switching.

Unlike the RAVE, the Jakarta board offers two intriguing expansion options for desktop television-watching or playing TV-based video games (like those from Sega and Nintendo). Jazz also offers Projector, for VGA to NTSC conversion.

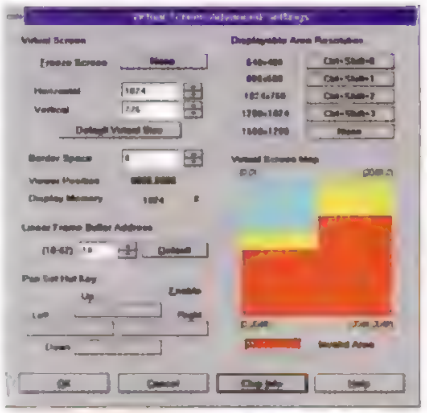
Two playback programs are included with the Jakarta board: Jazz Studio, which controls input/output from Jakarta and expansion sources; and Jazz View, a simple video-playback program. While both programs offer attractive and useful utilities, neither offered a timer or slider bar to gauge progress through the clip, which was disconcerting.

Jakarta's drivers are MCI compatible and accessible via Media Player and OLE. Jazz includes DOS power-management utilities and VESA and AutoCAD drivers. Microstation, OS/2, and Windows NT drivers are available on Jazz's 24-hour BBS.

RAVE REVIEWS FOR RAVE

For installation, Sigma's RAVE required an interrupt, a DMA channel, and an I/O port, but the Windows-based installation program did the dirty work in minutes. Graphics controls were minimal, but included a virtual desktop with extensive customization capabilities.

RAVE offers two display programs: a dedicated Demo-CD diagnostic player for testing video operation, and the RealMagic CD-Station for more general use.

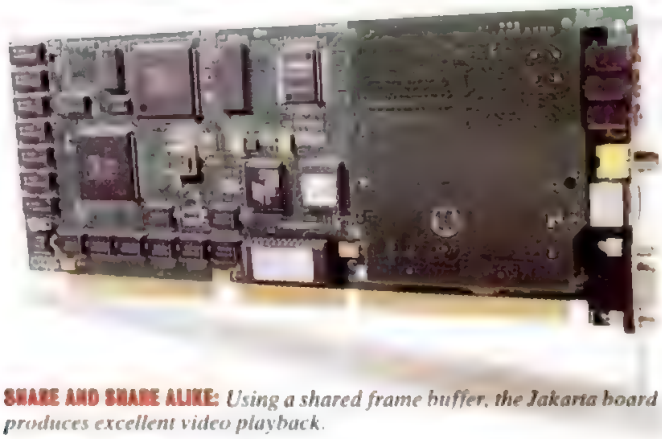


VIRTUAL WORKSPACE: *RAVE's extensive software includes a virtual desktop.*

Both are polished, second-generation programs with advanced features like multiple video queuing, progress bar and frame counter, and single-frame screen capture. RAVE's DOS programs offer simple MPEG playback in a variety of video modes. Drivers are available for AutoCAD, Windows NT, and an array of DOS programs including Lotus 1-2-3, Word Perfect, Microsoft Word, and GEM Desktop.

Unfortunately, the RAVE board does not provide drivers for OS/2. But where Jakarta offered little out-of-the-box pizzazz, RAVE includes a veritable cornucopia of MPEG CD-ROM titles, including disks of Elvis Costello and INXS.

Both products are polished and impressive. In terms of instant gratification and slightly more functional playback software, the Sigma RAVE steals the show. But the Jazz Jakarta produces higher-quality full-screen MPEG, with greater support—as well as integrated expansion into video capture, VGA to NTSC encoding, and TV video games. It also offers greater overall functionality and performance. Your choice depends on how far you want to go with video on your desktop.



SHARE AND SHARE ALIKE: *Using a shared frame buffer, the Jakarta board produces excellent video playback.*

Jakarta. *List price: $449. Requires: PC with VLB or PCI slot. Jazz Multimedia Inc., Santa Clara, CA., 408-727-8900; fax, 408-727-9092.*

Circle 429 on reader service card

RealMagic RAVE VLB. *List price: $489. Requires: PC with VLB slot. Sigma Designs Inc., Fremont, CA; 800-845-8060, 510-770-0100; fax, 510-770-2640.*

Circle 430 on reader service card

PORTABLE PCs

Toshiba's Satellite Pro T2150CDT Goes into Orbit with a CD-ROM

By Lance Ulanoff

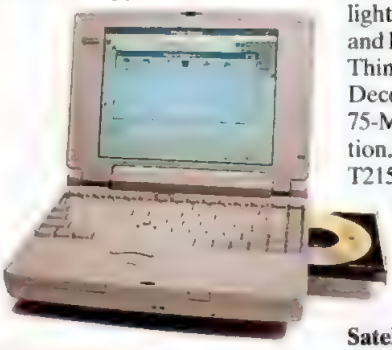
Taking multimedia on the road used to mean struggling with a suitcase-size luggable PC and hoping that hernias were still covered under your medical plan. The recent mini-explosion of multimedia-ready notebooks has made it so that you can start worrying more about your pocketbook than your back. Enter Toshiba's CD-ROM-equipped Satellite Pro T2150CDT, with an estimated street price under $5,000 and a list of features and performance that could make a multimedia desktop PC blush.

Built around a 75-MHz DX4 processor, the T2150CDT comes complete with a 500MB hard disk, 8MB RAM, a Toshiba double-speed CD-ROM drive, 16-bit SoundBlaster Pro-compatible audio, and a pair of Type II PCMCIA sockets. All this multimedia prowess is crisply displayed on the unit's 10.4-inch active-matrix color display—thanks in part to a C&T 655DGX-VL/ISA graphics accelerator chip backed by 1MB DRAM. If you can live with the somewhat dimmer dual-scan color display, the T2150CDS model sells for under $4,000.

The double-speed CD-ROM drive is hidden neatly in the right side of the unit. Press a button and the CD tray slides out. Our only worry here is that the entire CD unit, including the delicate laser eye, is exposed whenever you change CDs.

To date, no one has figured out how to build in both a CD-ROM drive *and* a 3.5-inch floppy disk drive while maintaining a reasonable form factor. Toshiba moves the state of the art along a little with the 7 pound 6 ounce T2150CDT; the floppy drive adds another 11 ounces to the travel weight. The system includes the power adapter inside the unit.

The T2150CDT's performance was above average on most of our benchmark tests, producing an impressive 56.6 score on our Winstone 95 application suite—20 percent higher than the average score turned in by our last roundup of notebooks. No less impressive was its 3-hour-plus score on our WinDrain battery test, which measures battery life under worst-case conditions. However, that value may decrease as CD-ROM drive usage is increased. Happily, the T2150CDT can charge its nickel hydride batteries in 2 hours.



PASS ME A CD: *The Satellite Pro T2150CDT makes on-the-road multimedia a reality.*

Among the small world of notebooks with CD-ROM drives, the $5,000 T2150CDT is lighter than the Panasonic V41 and less expensive than the IBM ThinkPad 755CD (First Looks, December 6, 1994), but lacks a 75-MHz Pentium processor option. The Toshiba Satellite Pro T2150CDT—with its impressive list of features—provides ground-breaking value for those who can't fit their work into a 3.5 inch floppy disk drive.

Satellite Pro T2150CDT. *Estimated street price: With 8MB RAM, 500MB hard disk, 10.4-inch active-matrix display, under $5,000. Toshiba America Information Systems Inc., Irvine CA; 800-334-3445, 714-583-3000; fax-back, 714-583-3800.*

Circle 432 on reader service card

PDAs

Sharp Picks Up the PDA Pieces with Zaurus

By Jonathan K. Matzkin

Sharp's $749 Zaurus ZR-5000 personal digital assistant attempts to build on the success of the company's Wizard organizer line while studiously avoiding the major mistakes made by the Apple Newton and other first-generation PDAs. While the Zaurus doesn't have handwriting recognition, it is smaller and lighter than traditional PDAs—and more powerful than current organizers.

PALMTOP: *Sharp's Zaurus is more capable than personal organizers and smaller than current PDAs.*

Sharp calls the Zaurus a KPDA, where the K stands for keyboard. Since the Zaurus's keyboard (which is identical to that of the Wizard OZ-9600) allows for efficient—if somewhat cramped—data entry, Sharp wisely steers clear of any attempt to decipher handwriting.

As with high-end Wizard systems, a pen does double duty as a pointing device and an input stylus for writing notes and drawing on the touch-sensitive, non-backlit LCD screen. We found that the pen-screen combination works well for jotting notes and makes for a better mouse substitute than many of the built-in pointing devices on notebooks. The downside is that the stylus is easy to lose.

At 6.7 by 3.9 by 1.0 inches (HWD), the dimensions of the Zaurus are close to those of the Wizard OZ-9600, which allows the Zaurus to slip easily into a purse or jacket pocket. The Zaurus weighs in at 13.6 ounces, about the weight of the typical notebook's power adapter. The system uses two AA batteries; they can provide several weeks of heavy use.

The Zaurus goes beyond the Wizard line with a new proprietary 16-bit processor, 1MB of RAM (750K of which is available for applications), and a new graphics-based operating environment. While the Wizards must use Sharp's proprietary add-on cards, the Zaurus is equipped with a Type II PCMCIA slot. A $100 snap-on modem (featuring 2,400-bit-per-second data transmission and 9,600-bit-per-second send-only fax capability) leaves the card slot free for another device.

Built-in software for the Zaurus focuses on personal organizer and communications duties. The word processor features drag-and- drop text editing, which really shows off the pen's usefulness. Files from different Zaurus applications can be associated in graphical folders that allow work to be organized by project or subject.

The Zaurus is fine for sending simple faxes, and it handles e-mail well. Much of the software, including the word processor and notetaker, allow direct faxing via either the snap-on or PCMCIA modem.

The Zaurus currently supports IrDA-compliant infrared wireless file transfers and printing. Sharp is currently working on software that will allow a PC to function as a workgroup communications server for small Zaurus workgroups. It is also teaming up with Motorola to provide support for that company's NewsCard Wireless Data Receiver.

Aimed at mobile professionals who don't want to lug around a notebook but need to remain connected, the Zaurus will have to prove that it has overcome much that was lacking in early PDAs.

Sharp Zaurus ZR-5000. *List price: With 1MB RAM, $749; data/fax modem, $100. Sharp Electronics Corp., Mahwah, NJ; 800-237-4277, 201-529-8200; fax, 201-529-8919.*

Circle 433 on reader service card

New Close-Up Offers Fastest Remote Windows Speed

Fastest Modem Communications

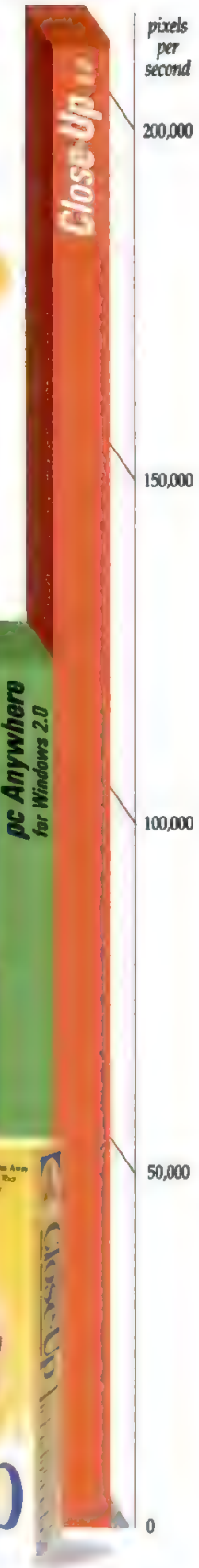
Now Close-Up, two-time winner of PC Magazine "Editors' Choice" award for remote communications software, has a brand new version that lets you view & control other PCs *by modem* – just as if you were there!

WinBench™95 Ver 1.0 by Ziff-Davis Labs Tests Remote Windows™ Speed

The graph on the right shows the speed of the three leading remote control programs when transferring Windows screens. As you can see, Close-Up handles more pixels faster, meaning you spend less time waiting for Windows screens to transfer.

WinBench scores (average of 10 runs):

Close-Up	*209,270*
pcAnywhere	*122,600*
Reachout	*101,900*



"Version 5.0 Close-Up was fast, but Version 6.0 has even better Windows performance and added features to keep it ahead of the pack."

– PC Magazine, July 1994

WINDOWS & DOS

Close-Up saves time & money by allowing you to connect between PCs running DOS or Windows, eliminating the need to switch between products when connecting to different PCs.

Why Is Close-Up So Fast?

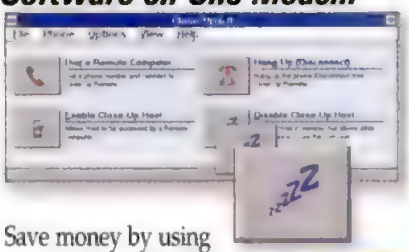
Close-Up learns as it works. It uses AI (Artificial Intelligence) to compress all Windows video function calls. That's why Close-Up does so well in Windows Benchmark tests (see WinBench 95 chart).

Close-Up uses its revolutionary Photographic Memory™ so that once Close-Up has seen all or part of a Windows screen, it's memorized. Then as screens change, Close-Up only transmits new unmemorized data. Incredibly, with this technology ***Close-Up gets faster & faster the longer you use it.***

Non-Intrusive Technology

Unlike most remotes, Close-Up's installation does not modify any of your sensitive Windows files, including the SYSTEM.INI and WIN.INI files, allowing Close-Up and your PC to run at optimal levels.

Use Close-Up and Your Fax Software on One Modem



Save money by using just one modem with Close-Up *and* your fax software. Simply click the Close-Up sleep icon. What could be easier!

Expert System Makes Communications Easy

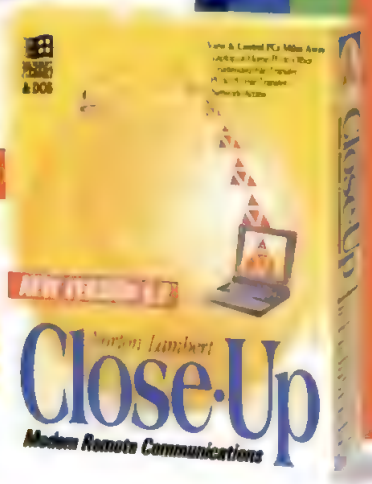
You don't have to be a communications expert to get the results of one. Close-Up has an Expert System that automatically analyzes system components and configures your system for maximum speed.

RISK FREE OFFER **Call 805-964-6767**

Try Close-Up 6.0! If you're not absolutely convinced that Close-Up 6.0 is the fastest remote program, we'll give your money back! Order Close-Up *Host & Remote*, a complete system for only **$199**.

Upgrade your competitive communications program to new Close-Up 6.0 *Host & Remote* now for only **$69.95***.

COMPETITIVE UPGRADE $69.95



We invite you to reproduce this test. Modems: Hayes OPTIMA 288 V.FC. Computer: (Host) Gateway, (Remote) Micron, Pentiums 90Mhz, 32MB RAM, 128KB RAM cache, 500MB HD, IDE controller, no hardware disk cache Video: (Host) STB Lightspeed 1MB VRAM, (Remote) Diamond Stealth 64 2MB VRAM. 800 x 600 pixels, 16 colors. SuperVGA.DRV 11/1/93. 75 Hz MS-DOS 6.22, SMARTDRV 2MB cache. WinBench 95 is available on ZiffNet via CompuServe. All products are shipping versions. Test performed without verification by Ziff. WinBench trademark of Ziff-Davis Publishing Co. Windows trademark of Microsoft Corp. *60 day money-back guarantee if purchased directly from Norton-Lambert. Offer expires 9/30/95. All prices in US Dollars. Prices exclude shipping.

October 1994	November 1993	January 11, 1993	February 25, 1992	February 1992	January 14, 1992	November 18, 1991	March 1991	January 16, 1990		October 31 1989	April 1989	February 1989	October 1988
Close-Up 6.0	Close-Up 5.0	Close-Up 4.0	Close-Up 4.0	Close-Up 4.0	Close-Up 4.0	Close-Up 4.0	Close-Up/LAN 2.0	Close-Up/LAN 2.0	Close-Up 3.0A	Close-Up/LAN 2.0	Close-Up 3.0A	Close-Up 3.0A	Close-Up 3.0A

© 1995 Norton-Lambert Corp.

CIRCLE 346 ON READER SERVICE CARD

VIDEO

Diamond Stealth 64 Stretches Video for the Desktop

By Jonathan Hill

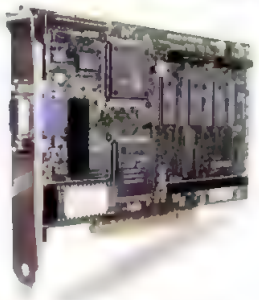
Diamond Multimedia Systems redefines how video will be viewed on the desktop PC with its new $389 Stealth 64 Pro Video VRAM card. The combination graphics and video accelerator can stretch full-motion video clips to full-screen without causing any dropped frames or synchronization errors in the process.

The key to the Stealth 64 Pro Video's high power and low price is the S3 Vision968 accelerator chip, which builds on the success of its predecessor—the Vision964 chip—by adding video-specific support for hardware scaling, color-space conversion, and filtering. The Stealth's driver is DCI-compliant, so requests for these services are handled by the Vision968 chip, freeing up your PC's processor for more pressing tasks.

The card's settings are customized using Diamond's InControl software. There is a long list of supported monitors, as well as the ability to choose virtual and actual display size, and color depth. InControl also allows you to adjust the system fonts and cursor color, access the current audio settings, and adjust video acceleration parameters.

We tested a PCI-based 2MB VRAM Stealth 64 Pro Video board in a Hewlett-Packard Vectra XU 5/90C equipped with a Pentium/90 CPU, 16MB of memory, and a 540MB hard disk. In 16-bit color mode at 1,024-by-768 resolution, the card produced a Graphics WinMark 95 score of 14.6 million pixels per second; at 800-by-600 resolution in 24-bit (true-color) mode, the card received a score of 13 million pixels per second. These scores are nearly indistinguishable from the top-ranked cards in our latest Graphics Accelerator roundup ("Rush Power," December 6, 1994).

Video acceleration was equally impressive. The Stealth 64 Pro Video card was able to stretch our 30-frame-per-second .AVI clips to four times the original size without any affect on the system CPU's utilization and without dropping any frames. The interpolation routines built into the Vision968 chip are not quite up to those of the Weitek 9130 chip that drives Diamond's Viper Pro Video card, but video quality was more than adequate and better than that provided by DRAM-based products like Tseng's Viper chip.



HOT CLIPS: *The Stealth 64 Pro Video board can expand video clips to full screen.*

The card provides full hardware support for Indeo and Cinepak codecs, and software support for MPEG decompression. For those who want the full works, Diamond offers a $299 Motion Video Player daughtercard option, which provides hardware MPEG playback and a composite video in port. The same MPEG accelerator card with 2MB of RAM costs $449.

The Stealth 64 Pro Video VRAM card provides top-rank graphics performance and adds video playback to your desktop for virtually no charge, providing a taste of the power that integrated multimedia will bring to the desktop.

Stealth 64 Pro Video VRAM. *List price: With 2MB VRAM, $389; with 4MB VRAM, $559. Diamond Multimedia Systems Inc., San Jose, CA; 800-380-0030, 408-325-7000; fax, 408-325-7070.*

Circle 401 on readers service card

MULTIMEDIA

InterActive Pulls You into Multimedia Authoring

By Eryn Brown

As if collecting the right audio, video, and image files for a multimedia application weren't hard enough, putting them all together can be as complicated as untying the Gordian Knot. HSC Software's $295 InterActive 2.0 uses the same icon-based authoring technology as in AimTech's IconAuthor, but puts the emphasis on ease of use.

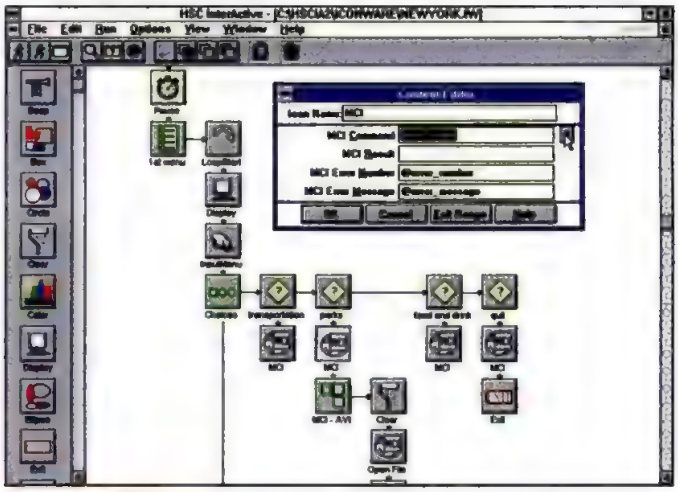
Getting started is simple. Just drag and drop icons for the application's major operations from the Icon Library to the Application Window. A flowchart represents the application under construction. Once the structure is in place, clicking on any of the icons opens up a Content Editor dialog box, where you can do everything from placing multimedia files to labeling the icons as they'll appear in the Application Window.

The icons themselves represent a wide range of functions. Some, like the Beep and Pause icons, are straightforward. Others—particularly composite icons such as Menu—represent multistep processes that are more difficult to master. The MCI-AVI icon, for example, is actually a series of icons that supply the MCI commands needed to play and control an .AVI file.

Once you get the hang of working with the composite icons, mixing and matching the component parts yields the precise sequence of events that you want. The product includes a royalty-free runtime module and IA Copy, an applet for distributing your application.

Creating attractive content with Interactive's editing modules, despite attempts to mask its complexity, is no easy feat. The graphics module, for instance, is not object-oriented, so once you add text it's permanent. Text can be moved by drawing a frame to select it, but this can be awkward. The module does not support scalable fonts, and there's only one level of undo. IconAnimate, the animation editor, only allows you to draw point-to-point paths.

InterActive is no substitute for an industrial-quality program like IconAuthor, but it offers an inexpensive means to ease your way into multimedia authoring.



GO WITH THE FLOW: *Using an accessible flowchart metaphor, Interactive clearly maps out an application's progression.*

InterActive 2.0. *List price: $295. Requires: 4MB RAM, 4MB hard disk space, CD-ROM drive, 8-bit sound card or better, Microsoft Windows 3.1 or later. HSC Software, Carpinteria, CA; 805-566-6200; fax 805-566-6385.*

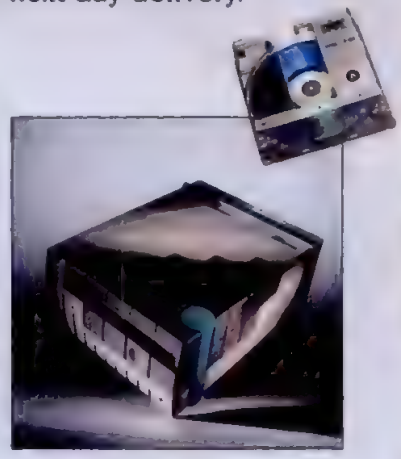
Circle 402 on reader service card

YOUR NEXT HARD DRIVE IS A PINNACLE OPTICAL.

Have you outgrown your hard drive? Need more storage? Go optical. There is no doubt that optical is the storage solution for the future. And Pinnacle Micro is the optical storage leader. Optical is fast - fast as most hard drives. Optical is removable - fill up a disk... just add another one. Optical is reliable - no data loss. No head crashes. Even better, optical media costs less than 15 cents per megabyte.

Now you can store unlimited amounts of data for endless applications such as graphics, imaging, digital audio, digital video, CAD/CAM, database, network storage and data archiving. You can even transport Megabytes and Gigabytes of large files within seconds just by handing a disk from one person to another. Or place your disk in a Fed-Ex package and ship it for next day delivery.

Tahoe™ 230 MB
3.5" *Portable Optical Drive*



Sierra™ 1.3 GB
5.25" *Optical Hard Drive*

Pinnacle offers the industry's fastest 3.5" and 5.25" optical drive solutions, the most affordable Recordable CD system, and network optical library systems that range from 20 Gigabytes to over 1 Terabyte for on-line, centralized storage. Pinnacle's award-winning line of optical storage solutions will increase productivity in every environment, from personal computing to the largest global network.

So before you buy your next hard drive... go Pinnacle optical. A storage solution you will never outgrow.

All trademarks and Registered Trademarks of Their Respected Owners

TO REACH THE PINNACLE CALL: 800-553-7070

PINNACLE MICRO
THE OPTICAL STORAGE COMPANY

CIRCLE 098 ON READER SERVICE CARD

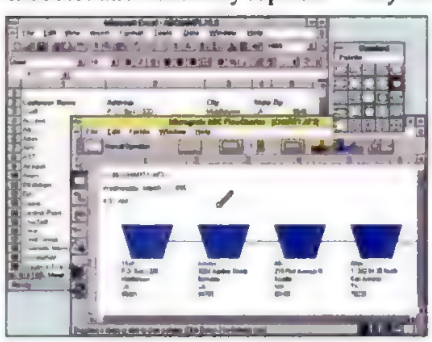
FLOWCHARTING

ABC FlowCharter 4.0: Everything for Novices to Corporate Developers

By J.W. Olsen

ABC FlowCharter 4.0 ($495) hits a home run. It provides something for every Windows user who needs to create flowcharts and other diagrams, while adding robust programming potential and automation of data to and from external sources. A $99.95 upgrade from Micrografx and competing products makes the move to FlowCharter 4.0 easy.

FlowCharter 4.0 contains four modules and nominally replaces ABC FlowCharter 3.0 (First Looks, April 26, 1994). ABC ToolKit (First Looks, August 1994) is the product's real predecessor, however. The four pieces of the ABC puzzle are: FlowCharter, DataAnalyzer, Viewer, and SnapGraphics. FlowCharter and DataAnalyzer were formerly marketed as ABC ToolKit.



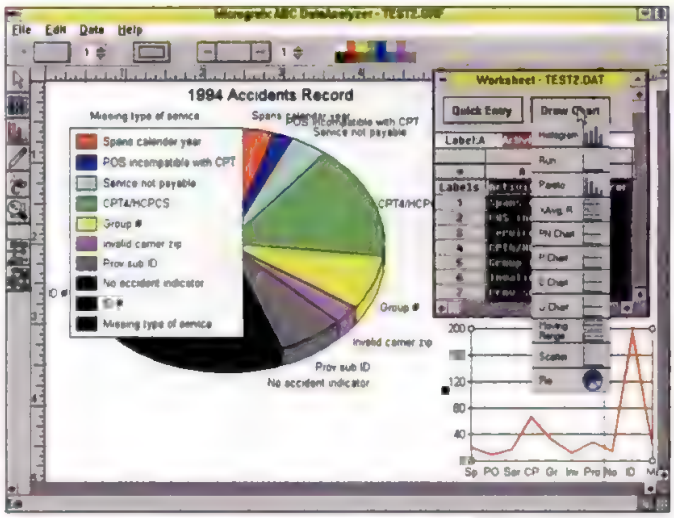
DATA IN: *OLE 2.0 automation programming lets external data flow into FlowCharter 4.0.*

The FlowCharter module is essentially an update of FlowCharter 3.0's charting software. It includes ground-breaking data association to shapes and lines, and totaling capabilities that increase the scope of the program. The DataAnalyzer module includes analysis and charting tools that transform data into a variety of diagrams, including Pareto diagrams, pie charts, scatter charts, and histograms. For those streamlining workflow, DataAnalyzer makes preparing organizational and process-flow diagrams easier.

FlowCharter 4.0's Viewer module allows the free distribution of any of the charts you create. Others can view, print, and annotate your charts, but they can't create new ones. Micrografx includes its entry-level SnapGraphics program for those who need to create graphics occasionally but don't need the power of the FlowCharter module. SnapGraphics competes more directly with products such as ShapeWare Corp.'s Visio and Corel Corp.'s CorelFlow. Switching between modules (except Viewer) is as easy as clicking toolbar icons, but each module has its own unique interface, so expect to spend some time learning each one.

You can install the FlowCharter module from the included floppy or CD-ROM disks. The CD-ROM contains fully functional, 30-day trial copies of Micrografx's Picture Publisher and Designer, plus 273 TrueType fonts.

FlowCharter is at or near the head of the diagramming class with 25 object palettes; drag-and-drop convenience; user-friendly control of connector lines; embedded objects such as spreadsheet cells, animation, and sound; and pop-up notes. The package also lets users assign data to objects and lines with nine automated calculations such as sum, median, and maximum or minimum values. FlowCharter is now MAPI e-mail enabled.



DATA OUT: *The DataAnalyzer module creates a variety of complex and attractive graphs of your data.*

The big step forward for FlowCharter and DataAnalyzer is that it now lets users move data transparently between modules. While ToolKit acted as an OLE 2.0 client and server, FlowCharter 4.0 offers a robust applications development environment for Visual Basic and Visual C++. (See the sidebar, "The ABCs of OLE.")

Because it has 350 reusable OLE objects, you can easily automate FlowCharter functions, access external applications and data, and exploit .VBX triggers to respond to user events within diagrams. Although these programming extensions can turn an ordinary flowchart into an interactive adventure, using them can be a handful for the inexperienced programmer. We expect it will be used primarily as a corporate development resource.

While greatly extending its appeal among power users, FlowCharter 4.0 is reasonably inviting to occasional users as well. Best of all, it provides a path to grow with users' needs and abilities. By bundling SnapGraphics, Micrografx addresses the needs of casual users who might otherwise choose Visio or CorelFlow. Visio may remain the easiest-to-use product on the market (by trading power for drag-and-drop convenience), but FlowCharter 4.0 has the edge in programmability.

FlowCharter 4.0 doesn't have all the diagram options found with Axum or the ability to breathe life into a static chart by providing the process simulation that Scitor Corp.'s ProcessCharter offers, but what the package does do, it does very well. The only major problem is data import, where users are restricted to .WMF or EasyFlow (HavenTree Software) formats.

FlowCharter 4.0 found a way to be all things to all users. Power and ease of use, now coupled with remarkable automation extensibility, make it the top choice for creating business charts.

ABC FlowCharter 4.0. *List price: $495. Requires: 4MB RAM, 21MB hard disk space, CD-ROM for some functionality. Micrografx Inc., Richardson, TX; 800-676-3110, 214-234-1769; fax, 800-994-6475.*

Circle 424 on reader service card

The ABCs of OLE

Mastering ABC FlowCharter 4.0's ground-breaking automation and event-triggering features requires time and training. You'll find what you need to take advantage of these powerful capabilities in the 500-page *ABC OLE Automation Programmer's Guide* (sold separately by Micrografx for $29.95).

You can develop for FlowCharter in Visual C++ 1.5 with its MFC library, but the book's tutorial and reference sections focus entirely on Visual Basic 3.0. Techniques of C++ implementation are orphaned in a five-page appendix, so you'll need a solid background in Visual Basic and C++.

Neither FlowCharter's programming extensions nor the guide are meant for casual users, but corporate developers will find everything they need to exploit FlowCharter's automation functionality.—*JWO*

Our New Models Have Incredible Features And Stunning Figures.

Introducing Our New Series Of Monitors.

With all the right features, plus figures that fit your budget, it's no wonder our new V-Series of 14" and 15" monitors is getting the spotlight. Which it should, given the stylish, well-rounded design that's easy on the eyes and great-looking on your desk.

But more than just another pretty face, our monitors are also sophisticated. Including microprocessor intelligence. Fingertip front-panel controls. 76Hz flicker-free refresh rates. And brilliant, interlaced images.

That's because each is from ADI—a world leader that's put over four million OEM monitors on the market in the last two years. Which means, for a great price, you get the quality and performance of a much more expensive monitor. Plus you get reliability. For proof, just look to our ISO-9001 rating. And our own manufacturing process that allows complete control over quality. Which is why we can offer a two-year warranty.

So phone us today. See why you can't afford to let these great models pass you by. For more information on ADI, our monitors and the ADI Authorized Reseller/Demo Program, call 1-800-228-0530. For automated faxed product information and editorial reviews, call 1-800-767-8182

The ADI V Series Family

	MICROSCAN 3V	MICROSCAN 4V
Ideal For:	Everyday business graphics, general business computing and Windows™ applications	General business computing, graphic user interfaces, desktop publishing and Windows applications
Picture Tube:	14" (0.28)mm	15" (0.28)mm
Resolution:	1024 x 768@ 60Hz	1280 x 1024@ 60Hz
Video/H-sync Bandwidth:	30-50kHz	30-64kHz
Front Panel Controls:	Digital	Digital

ADI

Any way you look at it.

CIRCLE 226 ON READER SERVICE CARD

ADI Systems, Inc. 2115 Ringwood Avenue, San Jose, CA 95131

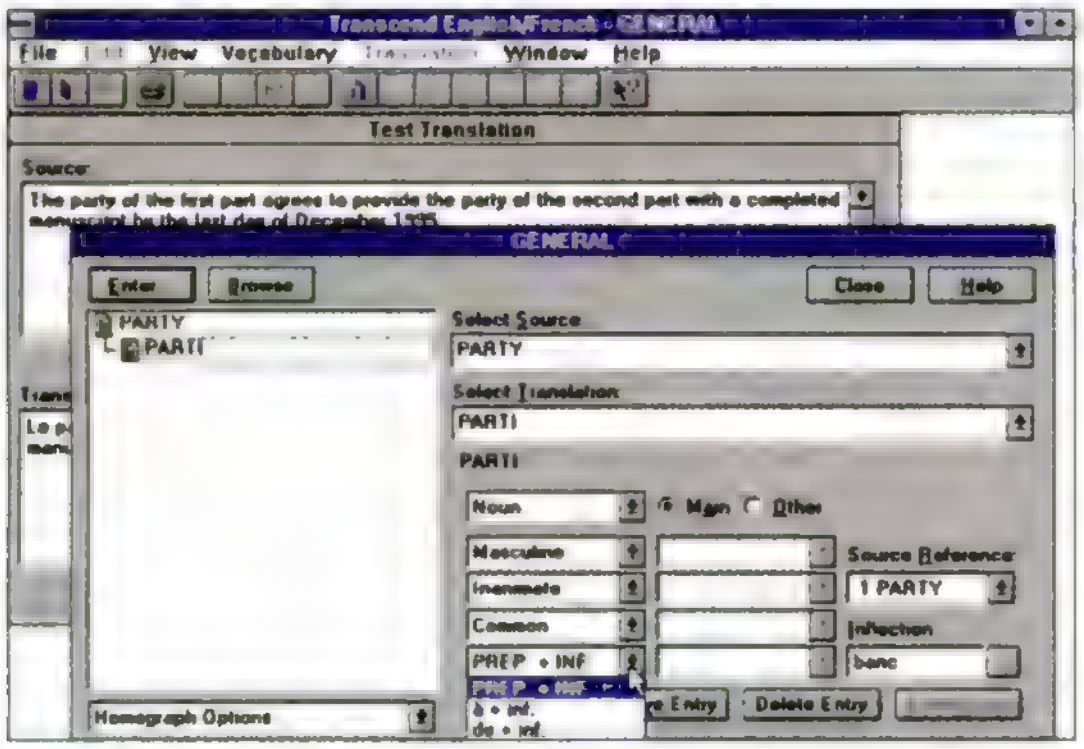
MicroScan is a trademark of ADI Systems, Inc. All other brands or product names are trademarks or registered trademarks of their respective companies. The Energy Star emblem does not represent EPA endorsement of any product or service. © 1995 ADI Systems, Inc. All rights reserved.

TRANSLATION SOFTWARE

Transcend: Something's Still Lost in the Translation

By Edward Mendelson

Intergraph's Windows-based Transcend 1.0 program brings the dream of automated translation a step closer to reality, although not quite close enough to let you discard your bilingual dictionaries or replace human translators. The software, which has its roots as a Unix program included with Intergraph workstations, translates at high speed with impressive accuracy, but still introduces unwanted errors and requires human intervention to get the best results.



PARTS: *Transcend's dictionary-modification dialog box lets you specify parts of speech for added words and phrases.*

You pay $495 for each supported language direction—in other words, to go back and forth between English and Spanish costs $990 for both the English-to-Spanish and Spanish-to-English modules. Intergraph has completed modules for translations between English and either French or Spanish, and—continuing with its emphasis on European languages—will have modules for German, Italian, and Portuguese out by the summer.

FAST AND DIRTY

Transcend typically translates at a rate of about 5,000 words per minute—notably faster than its PC-based competition, which include packages such as Globalink's PowerTranslator and MicroTac's Language Assistant Series. In tests with idiomatic French, Spanish, and English texts, the translated output was generally clear, even if the grammar, meaning, and diction were occasionally off the mark. Unfortunately, each document we translated also included a significant portion of mistranslated passages that were rendered incomprehensible to native speakers of the output language.

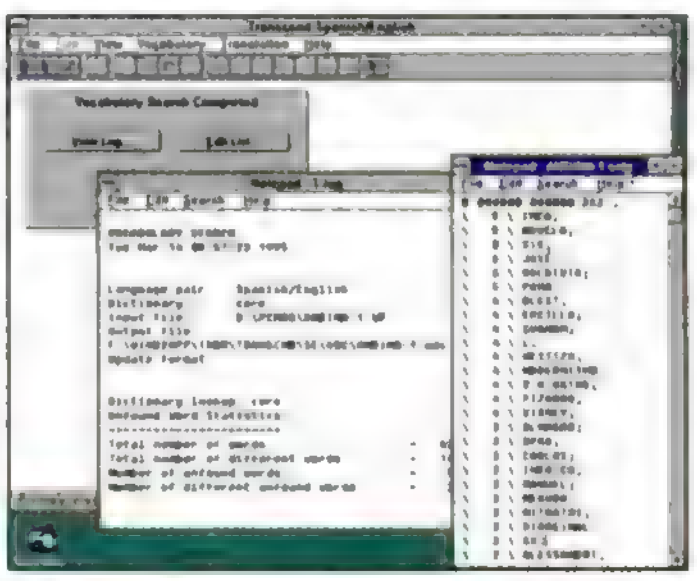
For example, a Spanish sentence that means "It would have been, had it not been for the conquest of Peru," was translated to: "It would be it without went not by the conquest of Peru." In addition, the program misinterpreted the Ecuadorian city Quito as the first-person verb, "I remove." And Transcend often got hopelessly confused by conjunctions, so that it translated a "from . . . to" phrase as if it meant "among . . . and."

You can fix many of these problems if you already know both the source and target languages and if you're willing to spend some time customizing the program's extensive dictionary. As with all translation packages, you'll get reliable results from Transcend only if it is used to save time by pretranslating material, not because you don't know the languages involved.

Each language-direction module uses a core dictionary that you can't edit. However, any number of custom dictionaries can be created by adding words that aren't in the core dictionary. During translating, you can use only one custom dictionary at a time, although future versions will let you use more than one. Entries in a custom dictionary override those in the core, so you can change the definition or gender of a word to make your translations reflect specialized text (such as in technical or medical material).

Creating or modifying a custom dictionary is time-consuming. You start by setting the program to scan your input files for items it doesn't recognize. You can edit the resulting word list in Notepad before incorporating the words into the dictionary. Whether or not you edit the list, the program will display each of the words in turn, and you decide which ones to include.

The next step is to type in a definition and laboriously use drop-down lists to specify the part of speech and other grammatical features of the word, such as whether a noun is common or abstract and whether it refers to a place, person, group, or other category. This dialog box can be exhausting to use because it requires heavy use of the mouse and is lacking in even rudimentary keyboard shortcuts.



UNKNOWNS: *Transcend scans input files for words it does not recognize.*

Transcend doesn't display either the input or output text within the program; you see only the original and the translation in your word processor. Source texts for translation can be in ASCII, .RTF, or WordPerfect 5.1 formats, or you can use supplied WordPerfect for Windows or Word for Windows macros to work with text that you are editing on-screen in either of those word processors.

An option of special interest to international programmers lets you input and output text in the .RTF variant used for Windows help files. Registered users will be sent additional filters for Ami Pro, FrameMaker, QuarkXPress, and other formats as they become available.

32-BIT REQUIRED

Transcend is optimized for Windows NT, and requires the Win32s extensions (included in the package) if you want to run it under Windows 3.*x*. Don't even try running it with less than 8MB of RAM. On our Pentium/90 test system with 32MB of RAM, the program ran without a hitch under Windows NT. We did encounter a problem when we tried to run Transcend on a Windows for Workgroups PC: It never got past the opening screen. Intergraph was unable to reproduce the bug, but acknowledged a similar problem from another user.

Compared with Globalink's PowerTranslator and MicroTac's Language Assistant series, Transcend is faster, makes fewer mistranslation errors, and can give the user a reasonable idea of the content of a French or Spanish letter or report. What Transcend misses are the nuances and subtleties of the languages it deals with, so you should have anything it produces checked before acting on the basis of what the program tells you.

Transcend 1.0. *List price: $495 for each translation direction. Requires: 8MB RAM, 15MB hard disk space for each translation module, Microsoft Windows 3.1 or later with Win32s extensions, or Windows NT. Intergraph Corp., Huntsville AL; 800-222-9242, 205-730-9832; fax, 205-730-9835.*

Circle 425 on reader service card

Looks like the whole world is getting Warped.

"OS/2® Warp is faster and prettier than ever before. It's reliable, and can give you 32-bit computing on your desktop today."

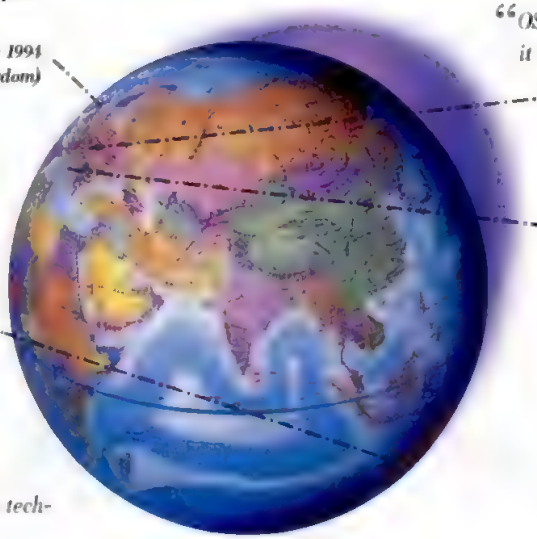
Personal Computer World, *December 1994* *(United Kingdom)*

"OS/2 Warp...brings advantages which give it a significant technical lead..."

The European, *October 14, 1994* *(Europe)*

"[OS/2] Warp is the natural upgrade for OS/2 for Windows™ users as it will run the latest versions of Microsoft®'s Windows software."

The Courier Mail, *October 18, 1994* *(Australia)*



"Fast, dependable, able to work better with fewer resources...a viable candidate for standard operating software for the multiplatform PCs of the future."

PC Windows, *September 1994* *(Italy)*

"With Windows 95 delayed...this is IBM's window of opportunity. OS/2 has always been technologically superior..."

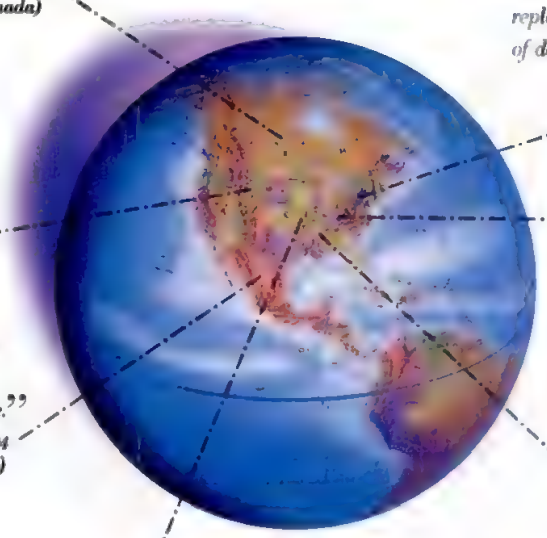
Kevin Linfield, Computing Now! *December 1994* *(Canada)*

"IBM's OS/2 has quietly evolved from a DOS replacement to a corporate-class, scalable family of desktop and server solutions."

PC Week, *November 14, 1994* *(USA)*

"...no operating system product to date has offered as much out-of-the-box value as OS/2 Warp."

InfoWorld, *November 14, 1994* *(USA)*



"...it's obvious that IBM® has put a great deal of time and effort into making [OS/2] Warp a highly-optimized, easy-to-install, and easy-to-use operating system..."

Stan Miastkowski, BYTE Magazine, *November 1994* *(USA)*

"The wizard of OS/2...the main feature of this new version is that it requires less memory and it provides better performance."

InfoCHANNEL, *October 1994* *(Mexico)*

"OS/2 Warp will bring your system up to speed, hitting all cylinders by putting serious power under the hood."

Home Office Computing, *February 1995* *(USA)*

"My personal favorite—perhaps the most useful productivity software available today—is IBM's superior operating system, OS/2."

FORTUNE, *March 6, 1995* *(USA)*

The 32-bit, multitasking, multimedia, Internet-accessed, crash-protected, Windows friendly, totally cool way to run your computer. **OS/2® WARP**

IBM®

OS/2 Warp is available from IBM for $89 by calling 1 800 3 IBM-OS2. OS/2 Warp with DOS and Windows application support is available from IBM for $139. Reseller prices may vary. OS/2 Warp consists of BonusPak and OS/2 version 3. OS/2 Logo is a trademark of the International Business Machines Corporation. IBM, Operating System/2 and OS/2 are registered trademarks of the IBM Corp. Windows is a trademark of Microsoft Corporation. All others are registered trademarks of their respective companies. ©1995 IBM Corp. All rights reserved.

PORTFOLIO MANAGERS

MetaStock: A Good Bet, as Far as Charts Go

By Sebastian Rupley

MetaStock, a time-honored leader in DOS stock-market technical-analysis software, now has a much easier-to-use, more flexible Microsoft Windows version. It's no guarantee of profits, but the $349 program from Equis International offers the sophistication that makes you feel like a financial pro while you're trying.

The product is much more than just a Windows make-over of MetaStock. It's object oriented, so that every object on screen (such as prices, moving averages, and share-volume indicators) can be modified or moved with the mouse. For example, we were able to combine a price line and a trend line from separate screens into one consolidated chart.

While MetaStock for Windows will no doubt satisfy those inclined toward chart analysis, this product and others like it (most notably Windows on Wall Street) focus on stock price and ignore a company's balance sheet, earnings, and fundamental data. Other products, such as Value Line's Value Screen III, Morningstar's Equities On Floppy, and Reuters Money Network offer fundamental analysis that allows screening of prospective companies based on price/earnings ratios and growth.

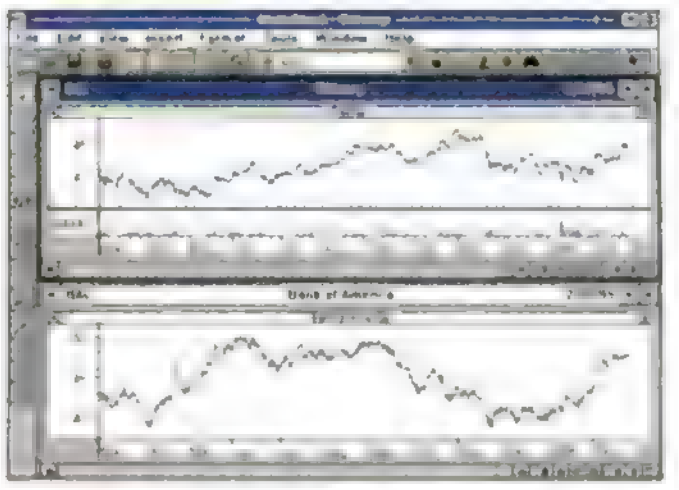
MetaStock is unique for its ability to back-test a strategy, the investment buff's version of Monday-morning quarterbacking. For example, we plotted Chrysler's stock price for the past year and then had MetaStock back-test an investment strategy called Negative Volume Index. The program sought out and annotated periods of down-trading volume that functioned as buy signals and generated a report with gains and losses of this strategy. Two utilities add further to MetaStock's depth: OptionScope allows for "What If" options analysis and Explorer searches through securities data for measures such as rates of price change.

The included Windows CompuServe Downloader module is a functional but limited way to get stock quotes. We suggest you spend the extra $49 for the module, which supports DBC Signal, Dial/Data, Dow Jones, MarketScan, and Telescan. MetaStock for Windows converts data from and exports data to ASCII, Microsoft Excel, Lotus 1-2-3, MetaStock for DOS, and Quattro Pro file formats. Disappointingly, the program doesn't support OLE, which would facilitate chart-sharing with applications such as Microsoft Excel. On the other hand, MetaStock for Windows includes nice touches not found in most financial charting products, such as an accurate Print Preview mode.

Despite the program's much greater ease of use under Windows, technical terms such as Fibonacci arcs and Vega functions will continue to intimidate investing novices, making it more suitable for financial whizzes.

MetaStock for Windows. *List price: $349. Requires: 4MB RAM, 10MB hard disk space, Microsoft Windows 3.1 or later. Equis International Inc., Salt Lake City, UT; 800-882-3040, 801-265-8886; fax, 801-265-3999.*

Circle 422 on reader service card



TRACK: *MetaStock excels at preparing charts of stock performance.*

FIRST LOOKS PLUS

From April 24 through 28, you can go on-line to download a demo or discuss MetaStock for Windows with Allan McNichol of Equis International Inc. and reviewer Sebastian Rupley. Type GO EXEC at any CompuServe ! prompt.

INTERNET

VocalTec: The Internet Phone Number?

By Tony Pompili

VocalTec's $59 Internet Phone opens up your PC to an exciting new application for using the Internet as a telephone. Except for some ruffled feathers in the Internet community and audio quality inferior to what the telephone company routinely delivers, Internet Phone makes the connection.

Internet Phone is Windows software that works with your PC's sound system, to enable you to speak with any other Internet Phone user. Instead of paying the rates of AT&T, MCI, or another carrier for the long-distance call, you're charged for the less expensive Internet hourly access rate plus your local phone connection, regardless of where you call. For a 4-minute call from New York to San Francisco, for example, Internet Phone made the connection for $.10, one-tenth the AT&T charge.

The key is Internet Phone's proprietary compression technique, which requires only a 7-kilobit-per-second (Kbps) bandwidth. Using Internet Phone is similar to using CompuServe CB, except it is vocal-, not character-, based. Keep in mind that it takes a bit more coordination to connect with your partner over the Internet than just picking up the phone.

Calling someone with Internet Phone is similar to calling someone over early satellite connections because Internet Phone's connections are not full-duplex. During our evaluation of the product we experienced about a 1.1-second delay between the time we spoke and the time our partner heard us, as measured by the unit's software. To make the system work, we had to slow conversation down a bit.

VocalTec has done a decent job of helping users cope with this staccato speaking pattern by including a status line that tells you when you can speak and when your partner is speaking. Oddly, it also shows when *you're* speaking.

This product is based on IRC (Internet Relay Chat) servers and has upset several IRC operators. In testing we found several IRC servers either blocked Internet Phone access or dropped connections. VocalTec has set up its own IRC servers (*irc.puver.com* and *iphone.vocaltec.com*) and expects to have more on-line by the time you read this.

Internet Phone is an inexpensive way to send your voice over the Internet.

VITAL SIGNS: *Internet Phone's interface shows the vital signs of your conversation, including who is speaking.*

Internet Phone. *List price: $59. Requires: 4MB RAM, 1.7MB hard disk space, Microsoft Windows 3.1 or later. VocalTec Inc., Northvale, NJ; 201-768-9400; fax, 201-768-8893; World-Wide Web, http://www.vocaltec.com.*

Circle 423 on reader service card

This
Is An Illusion...

ZEOS

This Isn't.

"The Pantera Pentium units' Winstone 95 performance was outstanding, each system leading its respective tier."

–*PC Magazine*, December 6, 1994

"Measurably the best in its category.... the winner in price and performance was the Pantera 90."

–*PC/Computing*, February 1995

"The Pantera is one hot performer.... It's a first-class machine from top to bottom."

–*Computer Life*, November 1994

"ZEOS set the standard... The obvious choice among the group."

–*Computer Shopper*, August 1994

"In this roundup of ultra-fast PCs, the ZEOS Pantera 90 offers the most bang for the buck."

–*PC Magazine*, September 27, 1994

"This is as good as it gets.... They don't come any faster."

–*PC World*, May 1994

"ZEOS Pantera rose above the crowd and posted the most impressive performance numbers."

–*Windows Sources*, August 1994

PC MAGAZINE EDITORS' CHOICE
Pentium-66 April 12, 1994
DX4-100 June 28, 1994

COMPUTER SHOPPER
Pentium-60 April 1994
Pentium-90 August 1994

PC WORLD
486DX2-66 January 1994, February 1994, March 1994, June 1994, December 1994, January 1995, February 1995, March 1995, April 1995
DX4-100 October 1994, November 1994, December 1994
Pentium-60 December 1994, January 1995, February 1995, April 1995
Pentium-66 June 1994, July 1994, August 1994, September 1994
Pentium-90 August 1994, September 1994, October 1994, November 1994, January 1995, February 1995

PC Best
Pentium-66 May 1994
Pentium-90 February 1995

Windows EXPERTS' PICK
Pentium-66 June 1994
Pentium-90 August 1994

WINDOWS MAGAZINE 1994 W
Pentium-90 November 1994

1994 W 100
486DX2-66 March 1994

Package 1		Package 2		Package 3		Package 4	
486DX2-50	$1295	486DX2-50	$1595	486DX2-50	$2095	486DX2-50	$2495
486DX2-66	$1345	486DX2-66	CN! $1645	486DX2-66	CN! $2145	486DX2-66	$2545
DX4-100	$1545	DX4-100	$1845	DX4-100	CN! $2345	DX4-100	$2745
Pentium-60	$1645	Pentium-60	CN! $1945	Pentium-60	$2445	Pentium-60	$2845
Pentium-75	$1695	Pentium-75	CN! $1995	Pentium-75	CN! $2495	Pentium-75	$2895
Pentium-90	$1995	Pentium-90	$2295	Pentium-90	CN! $2795	Pentium-90	$3195
Pentium-100	$2195	Pentium-100	$2495	Pentium-100	$2995	Pentium-100	$3395
Pentium-120	$2595	Pentium-120	$2895	Pentium-120	$3395	Pentium-120	$3795
➤ 4MB RAM		➤ 8MB RAM		➤ 16MB RAM		➤ 24MB RAM	
➤ 340MB local bus IDE hard drive with 120K cache		➤ 528MB local bus IDE hard drive with 120K cache		➤ **850MB** local bus IDE hard drive with 256K cache		➤ 1GB local bus IDE hard drive with 256K cache	
➤ 3.5" 1.44MB floppy disk drive		➤ **4X CD-ROM** drive and 3.5" 1.44MB floppy drive		➤ **4X CD-ROM** drive and 3.5" 1.44MB floppy drive		➤ **4X CD-ROM** drive and 3.5" 1.44MB floppy drive	
➤ **Diamond Stealth 64-bit** PCI local bus SVGA color graphics card with 1MB DRAM		➤ **Diamond Stealth 64-bit** PCI local bus SVGA color graphics card with 1MB DRAM		➤ **Diamond Stealth 64-bit** PCI local bus SVGA color graphics card with 1MB DRAM		➤ **Diamond Stealth 64-bit** PCI local bus SVGA color graphics card with 1MB DRAM	
➤ ZEOS 14" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch		➤ ZEOS 14" 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch		➤ **ZEOS 15"** 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch		➤ **ZEOS 15"** 1024 x 768 non-interlaced SVGA color monitor, .28mm dot pitch	
➤ Six-bay desktop case with two cooling fans		➤ Six-bay desktop case with two cooling fans		➤ Six-bay desktop case with two cooling fans		➤ Six-bay desktop case with two cooling fans	
➤ Microsoft Mouse		➤ Microsoft Mouse		➤ Microsoft Mouse		➤ Microsoft Mouse	
➤ MS-DOS 6.2, Windows for Workgroups 3.11		➤ MS-DOS 6.2, Windows for Workgroups 3.11		➤ MS-DOS 6.2, Windows for Workgroups 3.11		➤ MS-DOS 6.2, Windows for Workgroups 3.11	
				➤ **Lotus SmartSuite**		➤ **Lotus SmartSuite**	

Pentium-120 Available Now!

Included With Every ZEOS Pantera:

- ➤ Genuine Intel® Processor. ZIF socket for easy upgrading.
- ➤ Diamond Stealth PCI local bus color graphics card with 1MB DRAM, upgradable to 2MB DRAM.
- ➤ Flash BIOS.
- ➤ Two high-speed serial ports and one enhanced parallel port on the motherboard.
- ➤ Slots: Three PCI & 4 ISA (486), 3 PCI & 5 ISA (Pentium).
- ➤ ZEOS 101-key space-saving keyboard.
- ➤ 200 watt power supply with built-in surge suppressor. Switchable between 115/230V.
- ➤ FCC Certified Class B; UL Listed.
- ➤ Complete ZEOS Customer Satisfaction Package.

486 & DX4 Extras:

- ➤ RAM expandable to 128MB.
- ➤ EPA Energy Star compliant.

Pentium™ 60 Extras:

- ➤ RAM expandable to 384MB.
- ➤ On-board Fast SCSI-2 option.

Pentium™ 75, 90, 100 & 120 Extras:

- ➤ RAM expandable to 384MB.
- ➤ On-board PCI local bus Fast SCSI-2 and Ethernet LAN options.
- ➤ EPA Energy Star compliant (75, 90 & 100).

Favorite Options

528MB to 1GB Hard Drive Upgrade $170

1MB to 2MB Video RAM Upgrade $59

Diamond Stealth 64/PCI Video Card with 2MB VRAM
Fastest 64-bit accelerated video $249

Upgrade from a 14" to a 15" Monitor
ZEOS SVGA NI, 1024 x 768, flat screen $95

Upgrade from a 15" to a 17" Monitor
ZEOS SVGA NI, 1280 x 1024, flat screen $295

SCSI Controller Chip
For on-board SCSI. Includes drivers $49

Internal 14,000 bps V.32 bis Modem with 14,400 bps Send/Receive Fax $79

Internal 28,800 bps V.34 bis Modem with 14,400 bps Send/Receive Fax $199

Front Drive Bay PCMCIA SwapBox
Installs into 3.5" drive bay. 2 Type II, or 1 Type III and 1 Type II $179

ZNYX EtherAction™ 32
32-bit PCI Ethernet LAN adapter. Includes 10Base5, 10Base2 and 10BaseT connections $199

350MB Internal Tape Backup
170 to 340MB (with compression), includes backup software $179

Multimedia Upgrade
Sound card and stereo speakers $128

10-Bay Vertical Case $95

Lotus SmartSuite Upgrade
Five applications with online documentation $299

Many other affordable upgrades and options available. Call for details!

Free Lotus SmartSuite!

All Pantera packages include Microsoft DOS 6.2 and Windows for Workgroups 3.11. In addition, packages 3 and 4 include Lotus SmartSuite—1-2-3, Ami Pro, Freelance Graphics, Organizer and Approach—on CD-ROM with enhanced online documentation.

800-554-7172

24 Hours a Day
365 Days a Year

ZEOS INTERNATIONAL, LTD.

CN! —We can ship today! See back for more packages.
Fax Orders: 800-362-1205 or 612-362-1205. Phone Orders: Outside U.S. and Canada: 612-362-1212. Government: 800-245-2449. ZEOS Information Systems, Inc. GSA#GS00K94AGS5176

Folded edge of the page

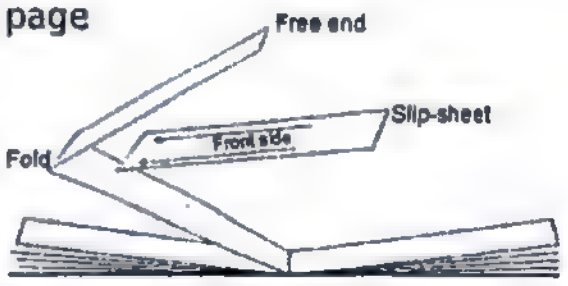
GbsSlipSheet-001

Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Inverted Back

1. Follow instructions on the other side

Back

1. Follow instructions on the other side

ZEOS® Pantera™— A Vision That's Real.

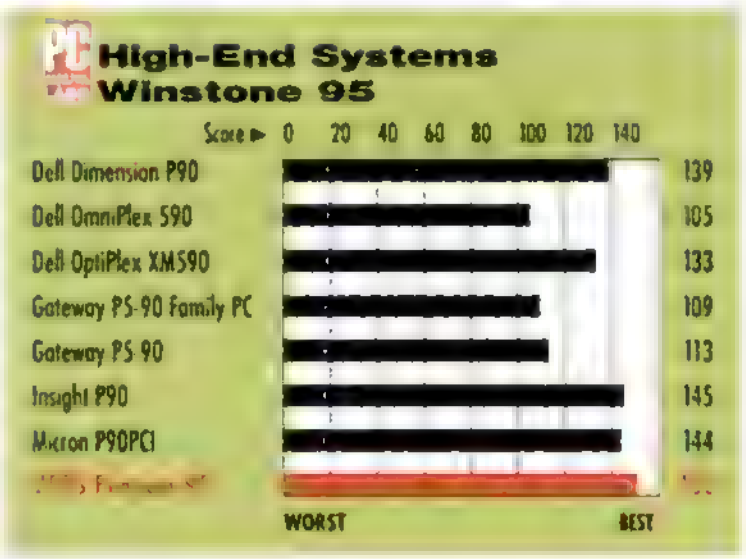
There's no illusion here. Truth revealed: ZEOS Pantera is your No. 1 high-performance desktop system. Leading experts from top industry publications agree. Unparalleled in its field, the Pantera has continuously earned award after award—review after review.

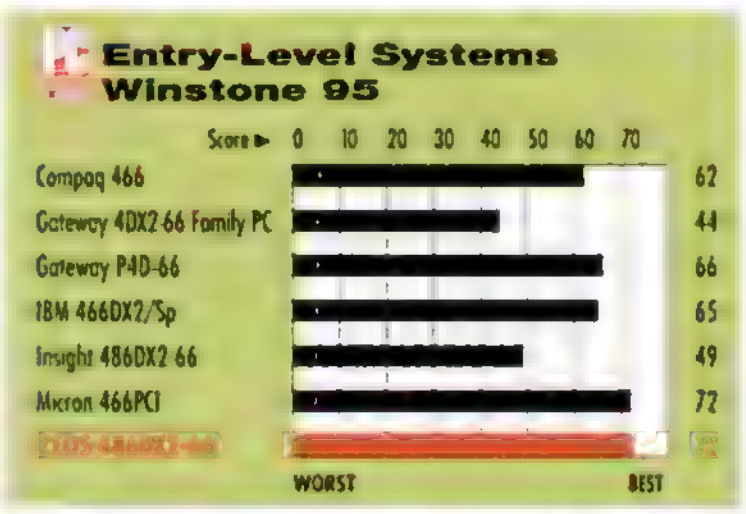
Month after month, the ZEOS Pantera outranks all others in performance, reliability, and value. It's the biggest bang for your buck. As *PC Magazine* said: "Overall performance leaders…the Pantera line has a lot to offer—strong performance at a reasonable price, with excellent documentation."

Continuing with the ZEOS tradition of providing you with top performance, unwavering reliability and exceptional value, the ZEOS Pantera is giving you a new way of looking at the world.

Striking Performance

The Pantera, based on Intel's 486, DX4 and Pentium processors up to 120MHz, is breaking record after record with its blazing performance and awesome power.





Reprinted from *PC Magazine*, December 6, 1994

In *PC Magazine*'s December 1994 Pentium and 486 round-up, they gave top honors to the ZEOS Pantera: "Few product lines fared as well in our price/performance index as the ZEOS Pantera family. A major factor in the Pantera units' success was the outstanding Winstone 95 scores: The Pentium machines produced first-place scores in their respective tiers, and the ZEOS 486DX2-66 earned a top-five ranking among the entry-level systems."

PC World concurred: The Pentium-66 and Pentium-90 processor-based Pantera PCs were "the fastest system(s) ever tested… Mark a new high on the performance chart!"

What makes the Pantera the top performer—time after time? Superior engineering—starting with a ZEOS designed motherboard created specifically to take full advantage of the latest technological advancements. The motherboard is loaded with exceptional features such as an on-board PCI Local Bus Enhanced IDE Controller and support for up to four IDE devices. For the fastest video performance, the Pantera includes a 64-bit Diamond Stealth PCI video card *standard*. For the quickest data throughput, most Pantera packages also include a 4X CD-ROM drive.

As *Windows Sources* said: "The clear winner is the ZEOS Pantera. Its scores were the best across the board."

Real Value

The ZEOS Pantera is a first-rate example of ZEOS' commitment to provide you with an excellent value on an award-winning machine. With all the extras, options, and 100% compatibility with all major operating systems—including Novell NetWare and OS/2—you can't go wrong.

And with our *Computers Now!* program, many of our most popular money-saving Pantera packages are ready to ship *the same day you order.* We also give you the option to custom-design a system to your exact computing needs.

Either way, you can buy with confidence because of our on-going dedication to provide you with high-quality features and state-of-the-art technology at an affordable price. As *PC/Computing* said, the Pantera "…is a deal you simply can't pass up."

And the value doesn't stop with your purchase. *PC World* said: "ZEOS's nonstop toll-free technical support schedule is unbeatable." *PC Magazine* agrees: ZEOS has won seven *PC Magazine* Readers' Choice for Service & Reliability awards. And we were the first to provide you with 24-hour toll-free technical support—every day.

Only one company gives you more features standard, incredible expandability, and supreme performance—all at an awesome price—ZEOS. And only one system gives you striking performance, unequaled reliability and the biggest bang for your buck—the ZEOS Pantera. To get the *Fastest Cat* around, call your ZEOS Systems Consultant today at 800-554-7172.

ZEOS® Can Ship Today!

Our most popular packages can be shipped the day you call.* Guaranteed!

486DX2-66 $1645
Pentium-60 $1945
Pentium-75 $1995

Package #2:

- 8MB RAM
- 528MB local bus IDE hard drive
- 4X CD-ROM drive, 3.5" 1.44MB FDD
- Diamond Stealth 64-bit PCI local bus SVGA graphics card with 1MB DRAM
- 14" SVGA color monitor
- 6-bay desktop case
- MS-DOS, Windows for Workgroups, Microsoft Mouse

Pentium-75 $2395

Top Gun:

The above system modified to include:

- 256K SRAM cache
- Diamond Stealth 64-bit PCI local bus graphics card with 2MB VRAM
- 15" SVGA color monitor upgrade
- 14.4/14.4 send/receive fax modem
- Lotus SmartSuite

486DX2-66 $1395

Package #2:

- 8MB RAM, 128K SRAM cache
- 528MB hard drive
- 3.5" 1.44MB floppy drive
- VESA local bus SVGA color video
- 14" SVGA color monitor
- 4-bay desktop case
- MS-DOS, Windows for Workgroups, Microsoft Mouse

Pentium-75 $2595
Pentium-90 $2895

Editors' Choice:

- 16MB RAM, 256K SRAM cache
- 528MB local bus IDE hard drive
- 4X CD-ROM drive, 3.5" 1.44MB FDD
- Diamond Stealth 64-bit PCI local bus graphics card with 2MB VRAM upgrade
- 15" SVGA color monitor
- 6-bay desktop case
- MS-DOS, Windows for Workgroups, Microsoft Mouse
- Lotus SmartSuite

Pentium-75 $2745
Pentium-90 $3095
Pentium-100 $3295

Hottest:

The above system modified to include

- 1GB local bus IDE hard drive
- 6-bay desktop case (Pentium-75) 10-bay vertical case (Pentium 90, 100)

DX4-100 $2995

Package #3:

- 8MB RAM
- 350MB IDE hard drive
- External 3.5" 1.44MB floppy drive
- DSTN color VGA 7.9" display
- Custom carrying case
- Extra battery
- MS-DOS, Windows for Workgroups
- Lotus Organizer
- 7.8" x 10.2" x 1.7"; 3.9 lbs.

Pentium-75 $3118
Pentium-90 $3418

Best MM:

- 16MB RAM, 256K SRAM cache
- 528MB local bus IDE hard drive
- 4X CD-ROM drive, 3.5" 1.44MB FDD
- 16-bit sound card, stereo speakers
- Diamond Stealth 64-bit PCI local bus graphics card with 2MB VRAM upgrade
- 17" SVGA color monitor
- 10-bay vertical case
- MS-DOS, Windows for Workgroups, Microsoft Mouse
- Lotus SmartSuite

Pentium-75 $3495
Pentium-90 $3795
Pentium-100 $3995

Best MM Supreme:

The above system modified to include:

- 24MB RAM
- 1GB local bus IDE hard drive
- High-power speakers w/ subwoofer

DX4-100 $3195

Package #3:

- 8MB RAM
- 350MB IDE hard drive
- Internal 3.5" 1.44MB floppy drive
- Dual-scan color VGA 10.3" display
- Custom carrying case
- Extra battery
- MS-DOS, Windows for Workgroups
- Lotus Organizer
- 8.9" x 11.7" x 1.9"; 6.3 lbs.

It's As Easy As:

1. Choose the ZEOS system package you want. (A sampling of our *Computers Now!*®– CN! – packages is shown at left.)
2. For same-day shipping, call ZEOS at 800-554-7172 before 1 p.m. Central Time, Monday-Friday.
3. Upon credit approval, we'll ship your system *the same day you order!*

Our Guarantee:

If we accept your order for immediate shipment and fail to ship your system under the conditions outlined, we will ship it *at our expense* as soon as it is ready.*

Need A Bigger Monitor?

We can upgrade your *Computers Now!* desktop or vertical system with a larger monitor–and still ship it the same day you order!*

800-554-7172

24 Hours a Day

ZEOS INTERNATIONAL, LTD.

Fax Orders 800-362-1205 or 612-362-1205 Phone Orders Outside U.S. and Canada, 612-362-1212, Government 800-245-2449 ZEOS Information Systems, Inc. GSA# GS00K94AGS5176 Purchase Orders, MasterCard, VISA, Am Ex, Discover, Z-Card, COD and leasing programs

Hidden Image

*Orders must be for Computers Now! configurations as we listed just a sampling here. Since we continuously update the list of configurations, please call for information and orders authorized. Though there is good advantage in having a few pre-built systems remain in stock, other ZEOS systems and custom configurations may take slightly longer, about a week. All orders are subject to credit approval. Most system upgrades available on new desktop Computers Now! packages; orders must be received before 3 p.m. Central Time, M-F.

Purchase orders are subject to approval. Business leasing programs available. All prices, specifications and availability are subject to change without notice. Call for current terms and warranty details. Prices do not include shipping. Some compatibility is Developer Tested Only. Novell disclaims all warranties with respect to this product. All products and company names are trademarks or registered trademarks of their respective holders. Intel Inside and Pentium Processor names are trademarks of Intel Corporation. ZEOS is a registered trademark. Computers Now! is a registered service mark. Z-Card is a service mark. Pantera, Ambra and ZEOS Meridian are trademarks of ZEOS International, Ltd. © 1995 ZEOS International, Ltd. 1301 Industrial Blvd. Minneapolis, MN 55413 (612) 362-1212 ZEOS is a publicly traded company (NASDAQ symbol: ZEOS).

PKV 95-0500-A

CIRCLE 155 ON READER SERVICE CARD.

WINDOWS SOFTWARE

PeopleScheduler Plus Adds Graphics to Schedules

By Ricardo Dobson

Do you plan schedules for a workgroup of telemarketers, retail workers, or service technicians? Do you track the number of hours worked and the breaks for full-time and part-time employees, some of whom work split shifts? Do you track vacation time for the people in your office? If you are currently doing any of these tasks by hand, Adaptiv Software's $129 PeopleScheduler Plus may be just what you need to straighten out the schedule.

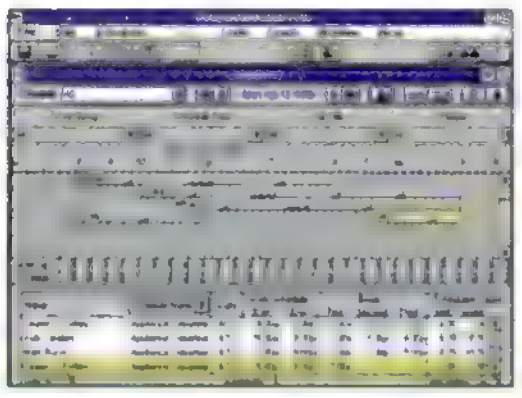
PeopleScheduler Plus distinguishes itself from nonspecialized products by allowing direct manipulation of schedules. It achieves this through a powerful visual interface designed for showing and managing workforce schedules. During installation, you input staff members, typical schedules, and other human resources information. Scheduling a worker for a day is as easy as selecting the day and clicking a button to enter the hours.

After you have set up a schedule, PeopleScheduler's unique TimeVisualizer display shows employee shifts for any period you choose. Employee work schedules appear as expandable timebars.

PeopleScheduler handles the timing of breaks with aplomb and can automatically schedule breaks so that the maximum number of employees remain on the job. You can show each worker's scheduled breaks on their individual timebar. You can also move, expand, or contract these timebars with your mouse to adjust the hours worked—breaks and all.

PeopleScheduler's Coach menu offers hand-holding help that walks you through typical scheduling tasks. Coaches provide on-screen step-by-step instructions, give feedback, and tell you what to do next.

Reporting is one of PeopleScheduler's strength. Two new TimeVisualizer chart options sort schedules by name or by time. If you want to generate payroll costs



SEEING TIME: *PeopleScheduler timebars can expand.*

or sales-by-employee reports, you can use PeopleScheduler's Export command with a special version of Concentric's R&R Report Writer ($29) to merge schedule data with text data extracts from other company archives.

Adpativ's PeopleScheduler Plus is a winner for several reasons. First, it competently addresses a typical business function. Second, it comes with all the niceties of Windows, including toolbars with tooltips, good drag-and-drop behavior, and edit-copy-paste functions. Third, the manual serves as an excellent supplement to the on-line help by providing clear and comprehensive instructions on all PeopleScheduler functions. Internet-based support is also available through Adaptiv's World-Wide Web home page.

All told, PeopleScheduler does a good job of putting employees to work.

PeopleScheduler Plus. *List price: $129. Requires: 4MB RAM, 5MB hard disk space, Microsoft Windows 3.1 or later. Adaptiv Software Corp., Irvine, CA; 800-598-1222, 714-789-7300; fax, 714-789-7320.*

Circle 419 on reader service card.

APPLICATIONS DEVELOPMENT

WindowBASE 2.0 Supports More Formats but Remains Confusing

By Tony Pompili

Software Products International's $199 WindowBASE 2.0, with its expanded support for XBase file formats, will appeal to individual and departmental developers needing one-stop access to databases built with Clipper, FoxPro, or dBASE. Though inexpensive, WindowBase offers a powerful array of database, query, input form, and reporting tools. The program's confusing interface, however, can make WindowBASE unwieldy to use and deploy.

WindowBASE was completely rewritten for Version 2.0, enabling developers to access popular XBase file formats as well as the program's own Open Access database format. As is the case with products like FileMaker Pro or Lotus Approach, WindowBASE appeals to power users looking to create custom applications.

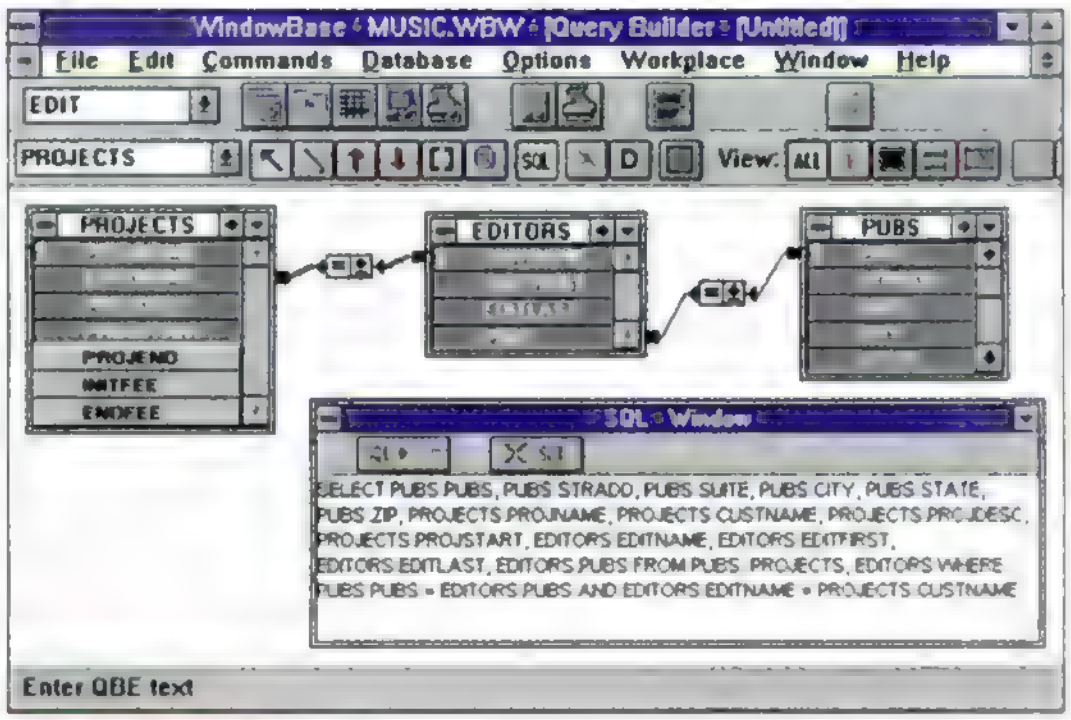
Developing databases and structures with WindowBASE involves little more than filling in simple tables and assigning data types and field lengths (much like with other products of this genre). You can join tables from the same database or from databases such as an Open Access and FoxPro by simply connecting common fields with the graphical linking tool.

Database data, which is stored separately from the database and table structures, can be displayed and edited in an efficient spreadsheet format. WindowBASE's customized input and display forms use rich text and graphics. To reduce form-design time, you can use the Forms Assistant; this tool lets you create custom forms without manually drawing fields and labels.

Where WindowBASE falters is in its often inconsistent interface and structure. The program makes it confusing for new users to comprehend how tables, forms, databases, and queries are associated with one another. In some cases, databases and connections share the same name. Navigation from project to project can be difficult, since you aren't sure what is where or how it's called. Similar products (such as Lotus Approach) conveniently list forms, databases, and queries in a single outline display.

Developers can assign record locking to WindowBASE applications for multi-user situations, but deployment to other users can be painful; database application code—including forms, structures, and queries—must be manually copied to each networked workstation. SPI plans to fix this problem with a forthcoming WindowBASE deployment application.

A powerful and inexpensive development tool, WindowBASE will be most useful to the experienced database developer.



PICK AN EDITOR: *WindowBase lets you use SQL or a QBE tool to build database queries and full-scale applications.*

WindowBASE 2.0. *List price: $199. Requires: 4MB RAM, 5MB hard disk space, Microsoft Windows 3.1 or later. Software Products International Inc., San Diego, CA; 800-937-4774, 619-450-1526; fax, 619-450-1921.*

Circle 421 on reader service card

COLOR SCANNERS

HP ScanJet 3c Picks Up Where the IIcx Leaves Off

By Alfred Poor

The HP ScanJet IIcx—the color scanner that won an Editors' Choice award in "Desktop Scanners: Color for All," February 7, 1995—has been put out to pasture. Taking its place is the HP ScanJet 3c, which is capable of higher resolution and greater color depth and includes a more complete package of software—but retains the IIcx's $1,179 price tag.

The system's hardware is impressive and a step forward from the ScanJet IIcx. The ScanJet 3c is a 30-bit scanner with a 600-dot-per-inch engine that is capable of producing scans of up to 2,400 dpi through software enhancement. This results in a marked improvement over the 24-bit ScanJet IIcx, which could scan at 400 dpi and enhance an image to 1,600 dpi.

While the ScanJet 3c's emphasis is on reproducing color, it also works well with gray-scale images. The ScanJet 3c can capture 1,024 levels of gray (10-bit images), as compared with 256 levels for the ScanJet IIcx.

COMPLETE PACKAGE

There's more to the ScanJet 3c story than just hardware. HP throws in a complete bundle of powerful software, starting with CorelPhoto-Paint 5.0. This full-featured image editor supports OLE, so you can embed and link images in Microsoft Windows–based application files.

For OCR (optical character recognition), you get Calera's WordScan 3.1 for the PC or WordScan Plus 1.2 for the Macintosh platform. WordScan takes advantage of HP's AccuPage technology to increase both text-recognition accuracy and scan speed.

The package also includes HP's ScanJet Copy Utility, which can turn your scanner, computer, and printer into a color or monochrome photocopier depending on what type of printer you have. The software includes all the features you'll need, from image scaling to the ability to produce multiple copies; it even has a scan-to-fax feature for sending scanned images directly to a fax modem.

Based on HP's DeskScan II Twain-compliant driver, the ScanJet 3c lets you scan directly into any application that supports the Twain standard. In addition to the expected controls for brightness, contrast, scaling, sharpening, and other image enhancements, the driver includes several time-saving features.

POWER SCAN: *The new HP ScanJet 3c can convert paper or transparencies into accurate 30-bit color images. Scans produced by the $1,179 ScanJet 3c have rich yet accurate colors, faithfully reproduced skin tones, and sharp, clean edges.*

We found two features to be most useful for efficiently producing several scans. While Automatic Find uses a preview scan to locate the image on the scanner bed, Automatic Type detects whether the image is black-and-white, gray scale, or color. The scanning software can also automatically halftone an image as it scans.

EASY LOCK

Like the ScanJet IIcx, the ScanJet 3c is easy to set up and get running. The scanner's carriage lock is a sliding plastic block, so you don't need any tools to lock or unlock it, and there are no nuts and bolts to lose; locking the carriage for shipping or storage is just as easy.

The scanner uses a SCSI interface, and you can connect it either to the ISA card that comes with the system or to any CAM (Common Access Method) or ASPI (Advanced SCSI Programming Interface) SCSI board you may already have installed in your computer.

The ScanJet 3c's software package includes a calibration routine for your monitor and printer. There is an on-screen routine for balancing the monitor settings, and the program can print out calibration targets on either black-and-white or color printers. These targets are then scanned to create custom calibration tables for those devices. During testing, we found this feature to be as sophisticated as it was easy to use, resulting in the saving of time and money by reducing trial-and-error printing, which adds up quickly with color printers.

Using default settings, the ScanJet 3c produced excellent images over a variety of samples we used. Colors were rich yet accurate, and subtle details came through even in deeply shadowed areas. Happily, the ScanJet 3c didn't introduce annoying jagged lines to the scans that had straight edges.

As good as the scans were, the ScanJet 3c is also quick. A 5- by 7-inch image scanned at 200 dpi and full color depth took 46 seconds, which is roughly twice as fast as the scanner it replaces and is competitive with other 24- and 30-bit products on the market.

ADD-ONS

If you want to do more with the ScanJet 3c, you have two available options. The 50-page automatic document feeder (ADF) lists for $559 and will come in handy if you intend to do a lot of archiving and character recognition work. There is also a transparency adapter that lists for $759; it can scan images from 35-mm slides up to 8.5- by 11-inch overhead slides.

HP doesn't skimp on the support it provides for the ScanJet 3c, either. The company's Express Exchange Service will overnight a new scanner to you in the event of a failure during the first year (available only in the United States).

While the ScanJet 3c is slightly more expensive than Agfa's $995 StudioScan II, it provides true 30-bit digital images at 600 dpi and includes a SCSI host adapter. The StudioScan II is a 24-bit scanner that uses 10-bit analog-to-digital converters to produce 400-dpi images, and does not include the adapter card. All told, the ScanJet 3c provides more scanner for the money.

The HP ScanJet 3c combines high resolution and 30-bit image scanning at a price that is comparable to several lower-resolution 24-bit scanners. If you thought that the ScanJet IIcx was a winner, wait until you get a look at the ScanJet 3c.

ScanJet 3c. *List price: $1,179. Requires: 4MB RAM (8MB recommended), 4MB hard disk space, available expansion slot for a CAM- or ASPI-compliant SCSI host adapter, Microsoft Windows 3.1 or later. Hewlett-Packard Co., Direct Marketing Organization, Santa Clara, CA; 800-722-6538, 208-396-2551.*

Circle 426 on reader service card

SCANNERS

Personal Scanners from UMAX and Visioneer Get Smarter

By Alfred Poor

There are big flatbed scanners that can handle just about anything and small handheld scanners that are useful when you want to take a quick swipe at something in a book. In between is a new generation of desktop personal scanners that quickly transform paper into digitized images for faxing, optical character recognition (OCR), graphics, or archiving.

Though the $495 UMAX PageOffice and $399 Visioneer PaperPort 2.0 can both scan a page in a few seconds, they each offer a particular view of what a personal scanner should be, and the hardware and software needed to fulfill that goal. As a result, you will probably have a strong preference for one or the other.

UMAX PAGEOFFICE

The UMAX PageOffice (from UMAX Technologies) looks a little like a desktop ink jet printer, with its 10-sheet input tray sticking up in the back. Unlike any printer, however, it has two buttons labeled "Document" and white) image at 300-dot-per-inch resolution, which is appropriate for OCR and document archiving. The Photo scan creates an 8-bit gray-scale (256 levels) image at 100 dpi.

Documents can be turned into editable images via the PageOffice's built-in OCR feature. Though you can adjust the settings, PageOffice was able by default to detect different blocks of text automatically (as in multiple-column layouts); it did occasionally misread some of the magazine pages we used as test images. The program was generally very accurate in the actual text conversion, but it did not preserve such formatting details as bold, italics, or point size.

Scanned images are stored on a desktop screen in PageOffice's bundled management program. This software lets you print the image, send it out through e-mail (if you have Lotus's cc:Mail or Microsoft Mail), or fax it (if you have a fax modem).

From the desktop, you can also drag and drop the image into any of six included applications; an ager, and PageType allows you to add text to an image—an excellent way to fill out a faxed form.

The PageOffice is a SCSI device that comes with its own interface card. The Windows-based software installs quickly and easily; it loads automatically when you start Windows, so it is always ready to run whenever you drop a page into the scanner.

If variety and gray-scale graphics are essential to your work, the PageOffice package should be a welcome addition to your desk.

VISIONEER PAPERPORT

The Visioneer PaperPort 2.0 places the emphasis more on words than graphics. The system lacks a paper tray, so you must feed the sheets manually, one at a time. Instead of including document management as a separate function, all images are automatically placed in the program's filing system, which is a bit more sophisticated than the UMAX's PageFile system.

ONE AT A TIME: *Since the PaperPort lacks a paper tray, you must feed pages manually.*

Instead of including proprietary applications, Visioneer expects you to use your existing Windows programs. The scanner works with all popular fax modem programs as well as a variety of graphics and word processing programs. Currently, the PaperPort meshes with 50 Windows applications; this number will grow. The program creates icons for any applications it supports.

You can drag and drop images onto any of these icons to send an image to the application. In our test, the program automatically installed Microsoft Word for Windows 6.0 and Windows Paintbrush as text and graphics better (though still not perfectly), and preserve font size and formatting when bringing text into Word for Windows.

Graphics scans are less sophisticated with the PaperPort. Scans can be set for either 200 or 400 dpi but are limited to 1-bit (black-and-white) images. The software compensates for the lack of gray-scale support by dithering the image on the fly to create halftoned gray scales. Though sufficient for occasional use, this is still not the same as true gray-scale support. One other drawback for graphics scanning is that you need to work with the full page: You can't crop the image until after you have taken it into a graphics-editing program.

The PaperPort uses a simple serial connection, and the software is designed so that it doesn't use hardware interrupts; you won't have a problem even if you already have two serial devices installed. As long as you have an available serial port, the PaperPort's installation, setup, and use is a breeze.

Despite its lack of a paper tray, the Visioneer PaperPort is a good desktop device for turning paper into pixels.

UMAX PageOffice. *List price: $495. Requires: 4MB RAM, 20MB hard disk space, Microsoft Windows 3.1 or later. UMAX Technologies Inc., Fremont, CA; 800-562-0311; 510-651-8883; fax*

AUTO-FEED: *The PageOffice scans pages by the stack.*

WHAT TO LOOK FOR IN A TOSHIBA, COMPAQ

See how the screen measures up against the one in a Compaq LTE Elite (10.4"TFT vs. 9.5"TFT).

The lithium ion battery will easily outlast a Toshiba T4850CT by over three hours.

With the SmartPoint trackstick your hands never have to leave the keyboard. Try that with a Toshiba T4850CT external trackball.

intel inside

AND IBM NOTEBOOK.

No sticker shock here. The 910N costs less than the IBM ThinkPad 755C.

On the road, even a few ounces can make a big difference. The 910N is over half a pound lighter than a Compaq LTE Elite.

Standard memory, you ask? The 910N features 8MB RAM, compared to the 4MB RAM in the IBM ThinkPad 755C.

With all the choices out there, you're probably asking yourself, "What to buy? What to buy? What to buy?"

Well, maybe this will help. Pictured to your left are a few comparisons to illustrate how the new AST Ascentia 910N stacks up against the field.

The 910N gives you the muscle of the Intel 486DX4/75MHz processor. Just imagine this kind of power and speed to crunch your facts and figures.

To see what's going on, there's a 10.4" TFT active-matrix color screen for crisp graphics. And on a single charge, the lithium ion battery lets you work six to ten hours.

As with every Ascentia notebook, the 910N comes with a 3-year world-wide limited warranty.* For a little extra reassurance, we provide a 48-hour repair service** and around-the-clock telephone support. It's what you'd expect from one of the world's largest computer makers.

Phone 1-800-876-4AST and we'll tell you where to find the Ascentia 910N. Now that you know what to look for.

YOU'LL LIKE THE WAY WE WORK™

Ascentia 910N

Intel 486DX4/75MHz or DX2/50MHz processors

10.4" diag. TFT active matrix or 10.3" DS-STN color display

340MB, 510MB or 700MB removable hard drive

8MB RAM, upgradable to 32MB

PCMCIA slots - Two Type II or one Type III

Lithium ion battery: 6-10 hours use

Weight: 6.1 lbs.

AST COMPUTER

*The Intel Inside logo is a registered trademark of Intel Corporation. All other product or a carry-in basis to the nearest AST-authorized service provider. **For one year in U.S. only*

CIRCLE 122 ON READER SERVICE CARD

ACCOUNTING SOFTWARE

First Accounting Keeps Bookkeeping Simple

By Kathy Yakal

Peachtree Software's new $49 First Accounting package trims the fat off of overgrown entry-level accounting programs. First Accounting looks and works like the popular Peachtree Accounting for Windows (PAW), but lacks some of its high-end functionality in such vital areas as inventory, data analysis, and information management.

Even without the added funtionality, First Accounting is still quite a bargain. It offers more sheer bookkeeping power for the dollar than any other Windows accounting program. You can import Quicken data or start from scratch, choosing from 60 sample Charts of Accounts.

The Setup Checklist is especially helpful for novices to get started. It lists every step required to get your company's books established after you've chosen your options (batch- or real-time posting, cash or accrual accounting) and defined your fiscal year.

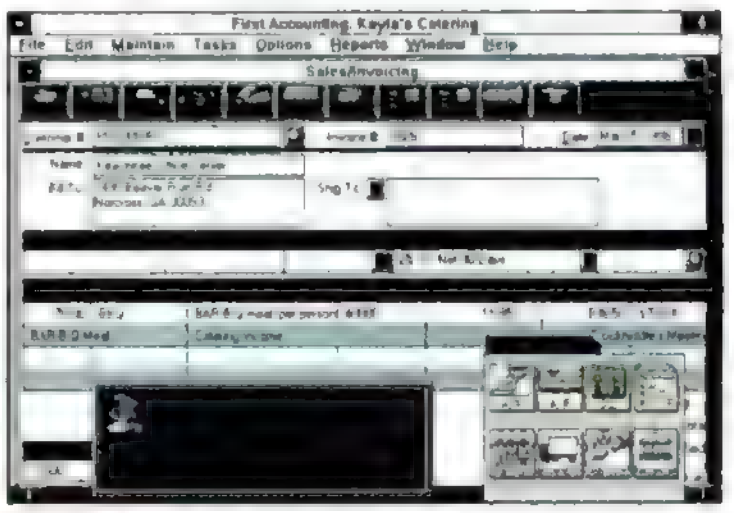
In addition, Peachtree's Smart Guides offer tips on using the current screen. And conventions such as file-folder tabs, module "maps," look-up lists, and Smart Data Entry (automatic fill-in on fields such as Customer I.D.) further simplify operation.

Predefined formats for database records, such as for customers and vendors, offer a generous number of data fields, as well as half a dozen custom fields. You can enter your records up front or on the fly, as you need them. Unfortunately, ASCII data import is not accommodated in First Accounting.

Like PAW, First Accounting contains the standard modules required to capably track your company's finances: General Ledger, Accounts Payable and Receivable, and Payroll. The program lacks a full-blown inventory module, but it lets you record inventory items and even does some rudimentary job costing.

Data-entry screens (customers and vendors, invoice forms, and the like) are almost as detailed as PAW's, but lack elements like finance charges and references to Action Items (a useful contact-management feature in PAW). The predefined reports included should be more than sufficient for the needs of a small business, however. You can customize them by setting filters (ranges, dates, and such) and changing their fonts. Forms such as invoices, statements, checks, and 1099s can be customized and printed.

Since Peachtree Accounting for Windows and First Accounting use the same database structure, those users who outgrow First Accounting can easily move up to the company's flagship program.



FIRST AID: *Smart Guides and module maps are two of First Accounting's help features.*

Peachtree Software's idea—to soften the power of PAW but carry the friendly tone of its interface over to an entry-level product—was a good one. It provides a good first step for those small-business owners who are still using pencil and paper to do their company's books.

First Accounting. *List price: $49. Requires: 4MB RAM, 12MB hard disk space, Microsoft Windows 3.1 or later. Peachtree Software, Norcross, GA; 800-228-0068, 404-564-5800; fax, 404-564-5888.*

Circle 420 on reader service card

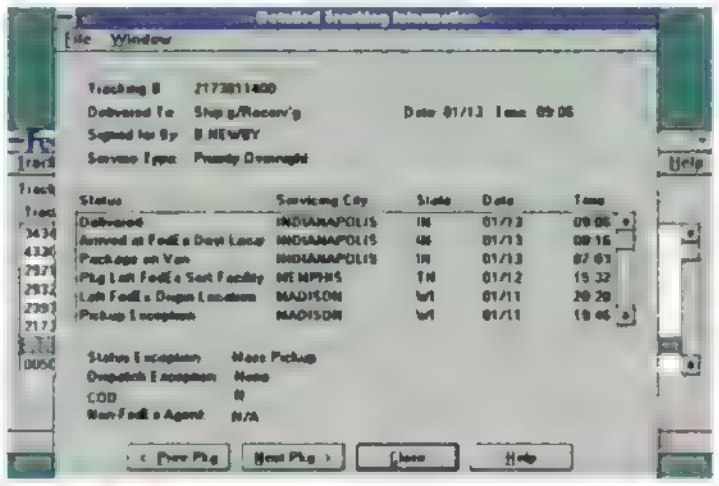
WINDOWS SOFTWARE

FedEx Ship Lets You Track Packages from Your Desktop

By David Haskin

FedEx Ship is for those who absolutely, positively, *must* control the overnight shipping process from their desktop PC. This free, simple-to-use Windows program (a Macintosh version is being developed) automates and simplifies most aspects of shipping with Federal Express, from printing air bills to locating lost packages.

FedEx Ship's main interface is a simple button bar. Clicking on one icon displays the address book window, in which you add recipients for shipping. Besides adding the expected name, address, and account number for individuals, you can also create recipient groups for quickly sending several packages at once. The program then walks you through the shipping process.



WHERE'S MY PACKAGE?: *FedEx Ship lets you get up-to-the-minute reports on a package's status.*

Besides selecting a recipient or group, you determine matters such as the type of package you are shipping, billing procedures, and special handling instructions. When you finish, the program dials Federal Express's mainframe-based Cosmos shipping and tracking system and logs in your packages. At this time, you can also dispatch a courier.

FedEx Ship then prints shipping labels for your packages and, optionally, a receipt. You'll need a laser printer, however, because FedEx Ship prints a bar code on the shipping label.

For some, the biggest advantage of using FedEx Ship is that it lets you track packages on your own. You do this by selecting the items you want to trace from a log of your previous shipping activity or by entering a wayward package's tracking number. After selecting the packages to track, FedEx Ship dials Cosmos, downloads the information, and displays a window showing the packages' progress at each step of the journey—from initial pick up to delivery. While it is not as fast as a phone call to FedEx, the Ship program provides accurate and timely information.

FedEx Ship is simple and useful, but it isn't a total solution. It can print a summary of your shipping activity but has no report generation capabilities; you must export information in comma-delimited format and use another application for reports. This limitation means that many customers will still need Federal Express's more powerful Powership turnkey hardware and software system.

The initial release we reviewed also had some first-version jitters, each of which has since been fixed. Specifically, searching the activity log on the basis of date when the log was empty caused a general protection fault and corrupted FedEx Ship's database index files.

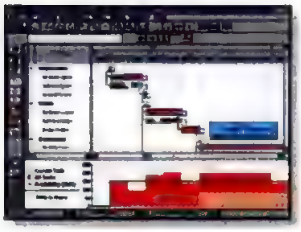
By unifying shipping and tracking functions with an easy-to-use interface, FedEx Ship makes sending and tracing packages with Federal Express a no-brainer. And you certainly can't beat the program's price.

FedEx Ship. *List price: No charge. Requires: 4MB RAM, 4MB hard disk space, Microsoft Windows 3.1 or later, laser printer. Federal Express, Memphis, TN; 800-463-3339.*

Circle 403 on reader service card

PROJECT MANAGEMENT IS CHALLENGING ENOUGH. YOUR SOFTWARE SHOULDN'T BE.

Project Scheduler® 6 for Windows™ is the easy way to keep in touch with all your projects. But you'll still have to wear your pager.



Beepers. Pagers. Whatever you call those ubiquitous little devices, one thing's for certain: they're a sure sign that managers are expected to stay on top of an increasing number of changing deadlines, schedule conflicts and resource allocation problems.

And while no project management software will free you from being paged throughout the day, InfoWorld calls new Version 1.5 of Project Scheduler 6 for Windows *"a no-lose bet."*[1]

"Whether you're managing one project or a thousand, Project Scheduler 6 provides all the intricate task, budget, and report features of a high-end project manager in an intuitive, usable, and inexpensive package." writes PC Computing.[2]

If you're new to project management, you'll appreciate how quickly and easily you can get started. And advanced users will value our most complete feature set yet.

Project planning is streamlined with a single, unlimited resource pool. Task and resource calendars simplify overtime calculations.

Toolbar icons offer quick access to functions and views you use the most. Plus with thirteen new report styles, there are now over forty pre-designed templates to give your work a great look from day one.

Also new is a second-generation ODBC interface for selectively sharing project data with other ODBC-compliant applications.

Project Scheduler's Advanced Resource Tracking Spreadsheet (ARTS)™ offers an easy, yet powerful, way to model and evaluate resource costs and usage on a period-by-period basis. Even quick comparisons of various "what-if" scenarios is a breeze with multiple undo/redos.

So quick, before your beeper goes off again, find out why Computer Shopper said, *"if you want one project management package to choose for the long haul, choose Scitor's Project Scheduler 6."*[3]

Before you make a project management software decision, call for this free executive summary.

Call 1-800-533-9876

Scitor Corporation

©1995 Scitor Corporation. 333 Middlefield Road, Menlo Park, CA 94025. Tel: 415-462-4200. Internet: sales@scitor.com. In France, call 33-1-44-32-05-00. In Germany, call 0-89-6-66-80-25. In the UK, call 0384-39212. In Australia, call (02) 956-7800. In So. Africa, call (011) 886-5283. Project Scheduler 6 is a registered trademark, and ARTS and the Scitor name are trademarks of Scitor Corp. Windows is a trademark of Microsoft Corp. [1]InfoWorld, October 3, 1994. [2]PC Computing, January, 1995. [3]Computer Shopper, November 1994.

WINDOWS SOFTWARE

What's in a Name, PC Style

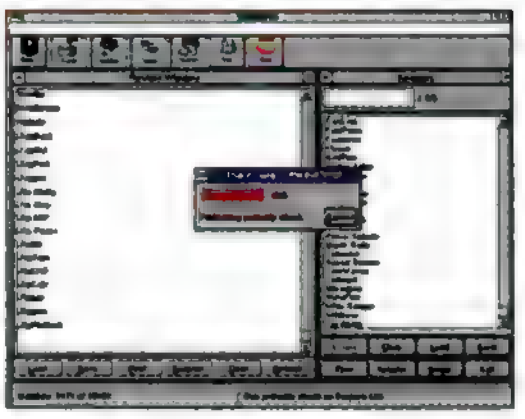
By Theresa W. Carey

Have you got a brand new product you're trying to name? The Namestormers' $495 NamePro 1.01 provides a set of databases and search criteria that can help you create unique monikers and check them for vulagarity and trademark infringement with the aid of your computer.

NamePro comes packaged with a database of nearly 31,000 names and parts of names that you can sort, combine, and play around with until you've got a name that you're ready to put through the trademark-checking process. Once you've chosen a name you like, you can check to see whether it has already been trademarked or search to see whether the name means anything obscene in any of several European languages.

To test the program, we decided to name some aliens and their planet for a science fiction universe. We chose several connotations (High Tech, New/Innovative, Smart/Intelligent, and Big/Large Size), restricted the length of the name to 14 characters, and then let NamePro loose to do its search.

In the end, the program came up with nearly 1,500 possibilities, and from that list we selected eight likely candidates. None of them checked out as "vulgar," and only two had possible trademark conflicts. Perhaps you'll even see some Avitects from the planet Ultipor II turn up in a future episode.



You will want to run NamePro on a PC with a fast processor, or else be prepared to sit around waiting while it crunches through all the database entries.

FOUR LETTER WORDS: *NamePro's profanity checker helps you avoid embarrassment.*

At $495, the NamePro program is less expensive than hiring a marketing consultant, and it can be fun, as well.

NamePro 1.01 for Windows. *List Price: $495. Requires: 4MB RAM, 15MB hard disk space, Microsoft Windows 3.1 or later. The Namestormers, Dallas, TX; 214-350-6214; fax, 214-350-7617.*

Circle 418 on reader service card

UTILITIES

DOS Menus for Life in the Network Age

By David Haskin

If you rely on tried-and-true DOS applications, then EZ-Menu 6.0 may be your ticket to a simpler life. This venerable DOS menuing program is full of new features which increase simplicity and security for both end users and system administrators.

DECISIONS, DECISIONS: *EZ-Menu displays its choices in a series of menus.*

You can launch as many as 120 DOS and Windows programs, tasks, and submenus from each menu. EZ-Menu also includes automation for launching tasks like backups and virus scans. Security options now include password protection for virtually every facet of the program. EZ-Menu will track usage activity of menu items and the overall PC in separate log files, and it can create usage reports with ease.

EZ-Menu's installation routine scans for programs and automatically adds them to menus. One problem we encountered, though, was that automatic menu creation faltered when applications weren't stored directly off the root directory. Also lacking is task switching, which enables users to jump among open DOS applications.

Laudably complete and well refined, EZ-Menu enables system administrators to create consistent and easily supported environments, and provides DOS users with a straightforward way of launching programs and tasks.

EZ-Menu, Version 6.0. *List Price: $69.95. Requires: 256K RAM, 1MB hard disk space, DOS 3.0 or later. Progressive Computer Services Inc., Metairie, LA; 800-628-1131, 504-831-9717.*

Circle 416 on reader service card

INTERNET UTILITY

InfoSeek Searches the Net

By Thomas W. Giebel

InfoSeek Search offers a fast, powerful, and easy way to pull the needle of information you're looking for out of the Internet haystack. This on-line service provides reasonably priced full-text searches of Usenet, the World-Wide Web, the major news wires, and specialized collections of computer and business publications, including Computer Select and Hoover's Company Profiles.

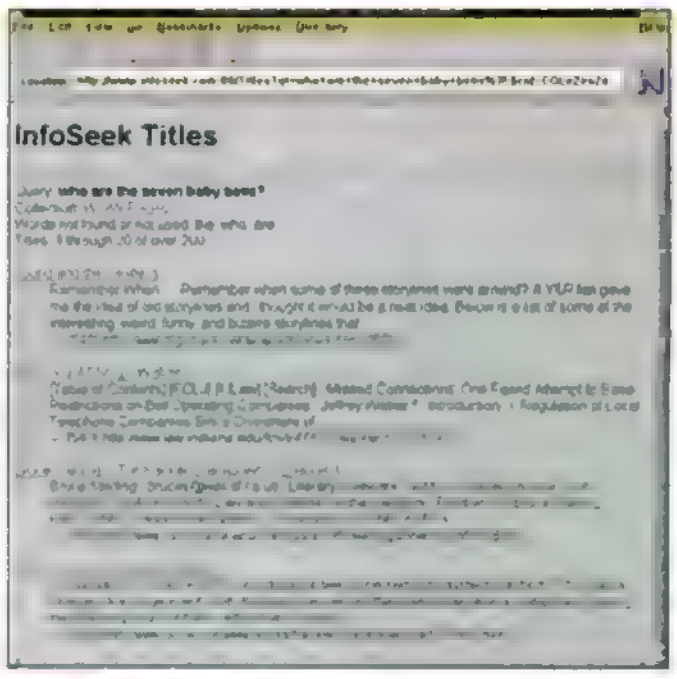
InfoSeek employs a search engine that accepts natural language queries such as, "Who are the seven Baby Bells?" No arcane Boolean operators are needed, although there are simple ways to customize a search to narrow the perimeters.

Search results are returned and ranked on-screen in order of relevance; the best matching documents are at the top of the list, and hyperlinks are provided that connect you directly to the document, Web page, or Usenet message referenced.

The search engine is billed as being precise, but nearly every search we tried came up with over 200 hits. The Baby Bell search on the Web yielded a document with the soap opera "The Young and the Restless" as the top hit. The same search produced better results in the news wires and computer collections, but the results illustrate the proliferation of useless and irrelevant information on the Net.

InfoSeek costs $9.95 per month for 100 transactions and $.10 for each query after that. This compares with the per-page charges of $.05 to $5 from the major on-line services.

If you're looking for a way to sift more efficiently through the mountain of data to be found on the Internet, InfoSeek can help.



WHEAT AND CHAFF: *InfoSeek can cull valuable information but includes irrelevant citations.*

InfoSeek Search. *$9.95 per month for 100 transactions; additional transactions, $.10 each. Requires: World-Wide Web browser with forms and NCSA authentication support. InfoSeek Corp., Santa Clara, CA; 408-982-4450; fax, 408-986-1889; e-mail,* info@infoseek.com; URL: http://www.infoseek.com.

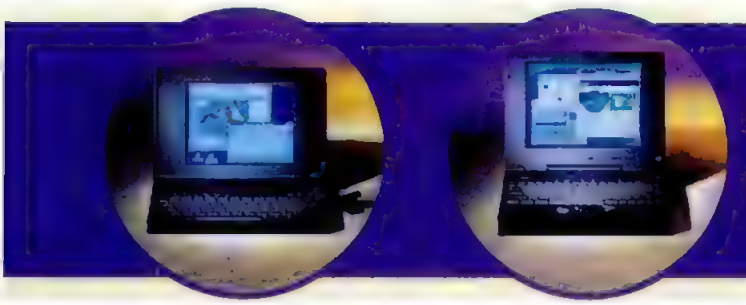
Circle 417 on reader service card

Powerhouse performance with exceptional portability.

HP OmniBook 600

Bold, dazzling color and stereo sound in an easily portable package.

HP OmniBook 4000



Two Great Road Shows.

from
$2,800*

- *3.8 pounds; 7.3" x 11.1" x 1.6"*
- *Intel 75-MHz 486DX4™, 50-MHz 486DX2™ processors*
- *8.5" DSTN VGA with 256 colors; simultaneous SVGA-out supports up to 1024 x 768 x 256 colors*
- *Accelerated local-bus video*
- *Full-sized, 85-key touch-typeable keyboard; built-in, pop-up mouse*
- *Typical battery life 3.5 hours (PC Magazine run down test 2.46 hours**)*
- *260-MB or 170-MB rugged, removable PCMCIA hard drive*
- *4/8-MB standard RAM, expandable to 12/16 MB*
- *Two PCMCIA Type II slots (or one PCMCIA Type III)*
- *External floppy drive comes standard*
- *Built-in I/O (serial, parallel, infrared, VGA out)*
- *Optional enhanced port replicator that adds SCSI-2 and HP LAN card slot*
- *Instant on/off; hot keys for faster application access*
- *EPA Energy Star certified*
- *3-year limited warranty, first-year Express Exchange*

from
$3,255*

- *Intel 100-MHz 486DX4, 50-MHz 486DX2 processors*
- *10.4" TFT (supporting up to 64K colors) or 10.3" DSTN display*
- *Accelerated local-bus video*
- *16-bit Sound Blaster-compatible stereo sound including two-built-in stereo speakers*
- *8/4 MB standard RAM, expandable to 32 MB*
- *Up to 520-MB hard disk drive*
- *Type III PCMCIA card slot (or use as two Type II)*
- *Optional second battery can substitute for floppy disk drive*
- *Optional enhanced port replicator adds SCSI-2, PCMCIA slots, and MIDI/joystick port*
- *Infrared*
- *Built-in I/O (serial, parallel, SVGA, audio, and keyboard/mouse ports)*
- *EPA Energy Star certified*
- *3-year limited warranty, first-year Express Exchange*

PC MAGAZINE EDITORS' CHOICE™ January 24, 1995 HP OmniBook 600

When it's time to get your show on the road, take along a great performer that carries its own weight. Like an HP OmniBook notebook PC.

For rich, vibrant color plus full stereo sound in an easily portable package, there's nothing like the HP OmniBook 4000 for impactful presentations. Then there's the winner of this year's *PC Magazine* Editors' Choice Award, the HP OmniBook 600. At just 3.8 pounds, it packs all the performance you need into a slim package.

All of which makes them both the perfect balance of power and pounds. For more information on HP OmniBook notebook PCs, call us today at 1-800-443-1254, Ext. 366. Like any good supporting act, they'll help your star shine even brighter.

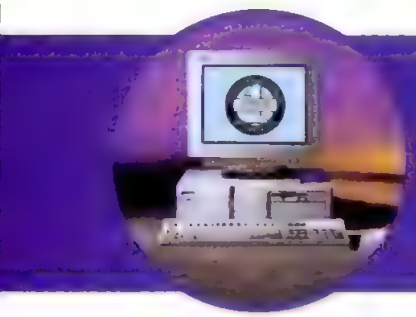
HEWLETT® PACKARD

intel inside

*U.S. list price, dealer price may vary. **PC Magazine Labs WINDrain 1/95. †In Canada, call 1-800-387-3867. MS-DOS is a U.S. registered trademark and Windows is a U.S. trademark of Microsoft Corporation. Intel and the Intel Inside logo are U.S. trademarks of Intel Corporation.
©1995 Hewlett-Packard Company PPG415

HP quality in value-priced PCs.

HP Vectra VL2



from
$1,079'

- *Intel 50-MHz 486SX2, 50- and 66-MHz 486DX2, 100-MHz DX4, upgradeable to Pentium™ Overdrive™ processor; Intel 60-MHz Pentium processor*
- *Chip upgrades to higher performance*
- *On-board accelerated local-bus video*
- *210-MB hard drive[1]*
- *4-MB RAM, expandable to 64-MB*
- *512 KB or 1 MB of Video RAM standard*
- *ISA Plug-n-Play compliant*
- *Desktop Power Management*
- *EPA Energy Star certified*
- *Local bus Fast-IDE hard disk interface***
- *1280 x 1024 video resolution***
- *Optional 128- or 256-KB cache memory***
- *Free three-year limited warranty for parts and labor[2]*

High-performance network-ready PCs in a slimline package.

HP Vectra N2

from
$1,419'

- *Intel 50-MHz 486SX2, 50- and 66-MHz 486DX2, upgradable to Pentium Overdrive processor*
- *Optional 128- or 256-KB second level cache*
- *270-MB, 14-ms Fast-IDE hard drive[1]*
- *32-bit Fast-IDE local-bus hard disk interface*
- *8-MB RAM, expandable to 96-MB*
- *Ultra VGA2 local-bus accelerated video supporting up to 1280 x 1024 resolution*
- *1 MB of video RAM standard, expandable to 2 MB*
- *Slimline package with two mass storage shelves and three ISA slots*
- *Optional integrated 10Base-T networking*
- *Multilevel security*
- *EPA Energy Star certified*
- *ISA Autoconfiguration utility (Plug-n-Play)*
- *Integrated Desktop Management Interface (DMI)[3]*
- *Free three-year limited warranty for parts and labor[2]*

High-performance PCs for the connected office.

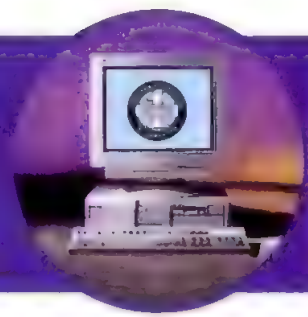
HP Vectra M2

from
$1,469'

- *Intel 50-MHz 486SX2; 50- and 66-MHz 486DX2, 100-MHz DX4, upgradable to Pentium Overdrive processor*
- *Optional 128- or 256-KB second level cache*
- *Four mass storage shelves; four expansion slots*
- *One available 32-bit VL-bus slot*
- *270-MB, 14-ms Fast-IDE hard drive[1]*
- *32-bit Fast-IDE local-bus hard disk interface*
- *8-MB RAM, expandable to 96-MB*
- *Ultra VGA2 local-bus accelerated video supporting up to 1280 x 1024 resolution*
- *Optional integrated 10Base-T networking*
- *Systems Diagnostics Utility*
- *EPA Energy Star certified*
- *ISA Autoconfiguration utility (Plug-n-Play)*
- *Integrated Desktop Management Interface (DMI)[3]*
- *Free three-year limited warranty for parts and labor[2]*

Exceptional 486 performance for advanced business use.

HP Vectra XM2



from
$1,779'

- *Intel 50- and 66-MHz 486DX2, 100-MHz DX4, upgradable to Pentium Overdrive*
- *PCI architecture*
- *Standard 256-KB second level write-back cache*
- *Four mass storage shelves; four expansion slots*
- *Two available 32-bit PCI expansion slots*
- *210-MB, 14-ms Fast-IDE hard drive[1]*
- *32-bit PCI IDE hard disk interface*
- *8-MB RAM, expandable to 96-MB*
- *PCI Integrated 64-bit S3 Vision-864 graphics accelerator supporting up to 1280 x 1024 resolution*
- *Optional PCI Integrated 32-bit 10Base-T networking*
- *Integrated Desktop Management Interface (DMI)[3]*
- *EPA Energy Star certified*
- *Free three-year limited warranty for parts and labor[2]*

intel inside

*Source: 1994 J.D. Power and Associates Desktop PC Customer Satisfaction Study.** Study conducted among business users and based on 1,528 user respondents.
**Feature included with some models. All HP Vectra PCs come with MS-DOS® 6.2 and MS Windows for Workgroups 3.11 pre-installed; HP mouse and keyboard included.
†U.S. list price, dealer prices may vary. Monitor not included. 'Other capacities available. [2]First year on-site, 24-hour service. Second and third year return to dealer
MS-DOS is a U.S. registered trademark and Windows is a trademark of Microsoft Corporation. Pentium, Overdrive and the Intel Inside logo are U.S. trademarks of Intel Corporation ©1994 Hewlett-Packard Company PPG412

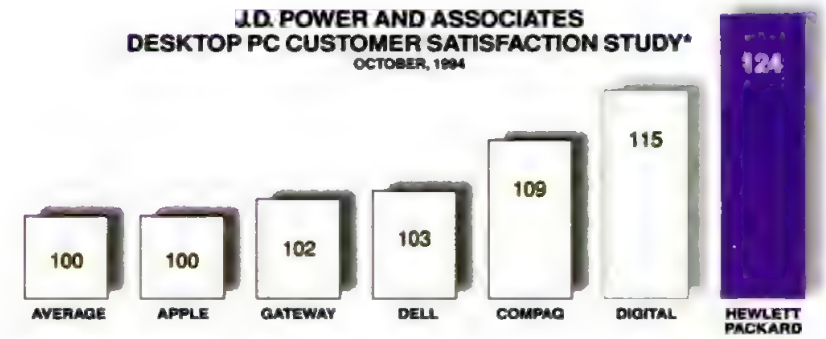
The ultimate PC for advanced business and technical applications.

HP Vectra XU

No other PC can display this icon.

from
$3,139'

- *Intel 90-MHz Pentium processor*
- *Second processor socket for MP Spec 1.1 multi-processing*
- *Standard 256-KB second level asynchronous or burst asynchronous write-back cache*
- *PCI architecture*
- *Four mass storage shelves (three front accessible); five expansion slots*
- *Two available 32-bit PCI expansion slots*
- *270-MB, 12-ms Fast SCSI-2 hard drive[1]*
- *Integrated 32-bit PCI SCSI-2 interface*
- *PCI integrated 64-bit S3 Vision-864 graphics with 1280 x 1024 resolution or PCI MGA Ultima Plus graphics with up to 1600 x 1200 resolution*
- *32-bit PCI IDE hard disk interface*
- *8 or 16 MB of RAM, expandable to 256 MB*
- *PCI Integrated 32-bit 10Base-T networking*
- *Integrated Desktop Management Interface (DMI)[3]*
- *Free three-year limited warranty for parts and labor[2]*



J.D. Power and Associates ranks HP highest in customer satisfaction among desktop personal computer business users.

Not to be boastful, but people are taking a lot more notice of HP PCs lately. After all, they're the only computers that carry the symbol of one of the most prestigious awards in the business.

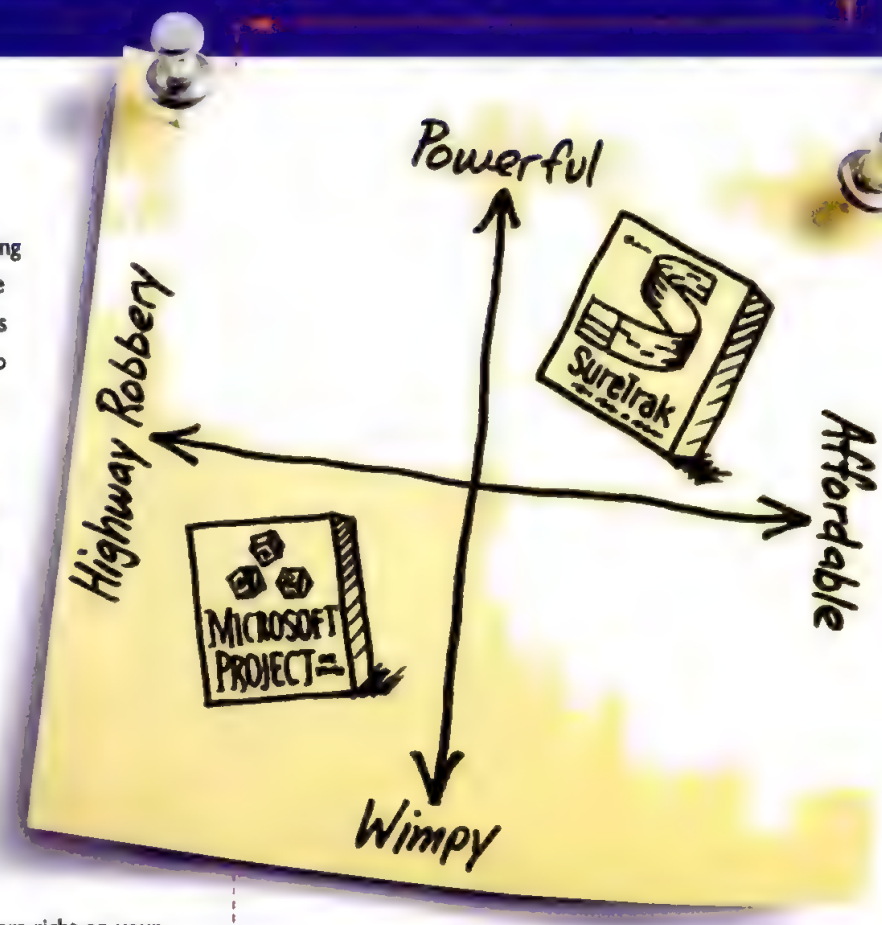
Fact is, in overall scoring HP outpaced every other vendor in the field.

Of course, HP PCs also lead the pack in value, with all the features you need, at prices you can afford.

For a copy of *The Power Report*℠ on the Desktop PC Study, or the name of the dealer nearest you, call us at 1-800-322-HPPC, Ext. 8998 today. And join the ranks of the most satisfied PC customers in America.

HEWLETT® PACKARD

Everything you need to know about project management software.



You're scrolling through screens. Shuffling cue cards. Wishing Microsoft Project had the power to organize by something as simple as who's responsible for what. But don't give up on project management software. Just think SureTrak Project Manager® for Windows.™

Think power. Other software doesn't take into account delays, changes, or the fact you might want another view of your project. Welcome to the real world. SureTrak shows the plan any way you like. Organize by phase, task, project, or responsibility. You name it. Plus, SureTrak sees a project the way it is—warts and all. So you get the real story, not a naive picture.

Think quick. Only SureTrak has Progress Spotlight.™ Just drag the data date and wham! A graphical to-do list of tasks, deadlines, and who's responsible appears right on your screen. Perfect for recording progress, too.

Progress Spotlight™ gives you a detailed look at upcoming activities.

But the screen isn't the only place SureTrak looks good. Think reporting. Easy-to-manage, colorful, sensible—even multiproject—reporting. SureTrak lets you slice and dice information to emphasize what's most important. And no matter what angle you choose, SureTrak's reporting gets action.

Thinking expensive now? Think again. Microsoft Project lists for $695. So does SureTrak. But you can get SureTrak from Primavera, the project management experts, for the introductory price of just $299.

More powerful. More affordable. SureTrak Project Manager is all you need to know. So think SureTrak. And act now.

PRIMAVERA

How the world says project management

Order SureTrak Project Manager® for only $299. Call 1-800-973-1335.

©1995 Primavera Systems, Inc. SureTrak Project Manager is a registered trademark and Progress Spotlight is a trademark of Primavera. Third-party names and trademarks are property of their respective holders. For inquiries outside the U.S. please fax 801-973-9725.

CIRCLE 148 ON READER SERVICE CARD

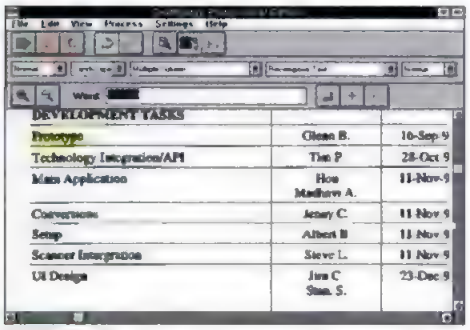
New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Asa Somers

OCR Leaps Forward

The problem with optical character recognition (OCR) packages—apart from not always correctly recognizing words—has traditionally been that they don't work directly with your word processor. TextBridge Professional Edition 3.0, from **Xerox Corp.**, addresses both issues. Its Document Recognition Technology flows text directly into your word processor for editing; you launch the program by clicking on "TextBridge OCR" from the menu bar of your application. The imported documents retain their original format, including graphics, captions, and headers and footers.



WRITE ON: *TextBridge Professional preserves your document's original formatting.*

You can import editable tables into a word processor or spreadsheet, and the Custom Proof feature lets you adjust the package's level of proofreading pickiness. On-the-fly training is also supported, letting you intervene and correct recognition errors. Xerox offers the $99 TextBridge 3.0 for less-demanding OCR requirements.

TextBridge Professional Edition 3.0. *List price: $349 (competitive upgrade, $199). Xerox Corp., Palo Alto, CA; 800-248-6550 ext. 3, 415-813-6800.*

Circle 405 on reader service card

A File Unzips Itself

Niko Mak Computing is shipping WinZip Self-Extractor, a Windows-based utility that lets you create a self-extracting .ZIP file. These files include decompression or *unzipping* software, so they can be decompressed by another person without using a separate program. Unzipping self-extracting files is as easy as double-clicking on an icon. The Self-Extractor includes a license to distribute royalty-free .ZIP files.

WinZip Self-Extractor. *List price: $49. Niko Mak Computing Inc., Bristol, CT; 800-242-4775; fax, 713-524-6398.*

Circle 406 on reader service card

HP Goes Wireless: Latest LaserJets Feature IR

Intended for use in small-office environments, the new LaserJet 5P and 5MP printers, from **Hewlett-Packard Co.**, feature 6-page-per-minute output speeds, 600- by 600-dpi print quality, and a slew of built-in fonts. Most impressive, however, these two entry-level networkable models—expected to sell at street prices of $900 and $1,100, respectively—feature built-in IrDA-compliant infrared ports for wireless printing.

The LaserJet 5P uses HP's enhanced PCL 5 printer language. It comes with 2MB of standard memory (expandable to 50MB via standard SIMMs) and 45 built-in scalable fonts, and it offers an additional 65 TrueType fonts on-disk. The LaserJet 5MP includes Adobe PostScript Level 2 software for use in Macintosh or mixed PC/Mac environments. It includes 3MB of memory (expandable to 35MB) and 35 built-in fonts, with an additional 75 fonts on-disk.

The two models offer several connectivity options; each comes with two high-speed bidirectional parallel ports (one B-type, one C-type), a LocalTalk port, and an infrared port; the LaserJet automatically switches among input sources. The IR port allows for data transfer at speeds of up to 115 Kbps and at distances of up to 3 feet. You must have a desktop or notebook PC equipped with both an IR port and infrared printing capabilities to do wireless printing on the LaserJets. IBM's ThinkPads and HP's OmniBooks have this capability, and more IR-ready machines are expected soon.

HP LaserJet 5P. *List price: $1,109.* **HP LaserJet 5MP.** *List price: $1,299. Hewlett-Packard Co., Santa Clara, CA; 800-752-0900.*

Circle 404 on reader service card

Picture Window Develops

Version 1.1 of Picture Window, a digital-imaging system from **Digital Light & Color** (DLC), includes a host of enhancements and contains an automatic ordering feature for DLC's quick-turnaround print service. Picture Window 1.1 now lets you create custom slide shows that can be viewed without a local copy of the program. This version also offers rudimentary but effective image-editing filters such as warp, blur, unsharp masking, and noise transformation, as well as a way to turn your favorite pictures into screen savers.

Once your photos look right on-screen, Picture Window can automatically prepare them for shipping to DLC's service bureau, which will print them out and send them back to you—by overnight air, if you specify. Prices are a bit steep: $8.95 plus shipping for a single medium-size print (up to 6.0 by 8.9 inches) and $14.95 for a large print (up to 8.5 by 11.9 inches).

Picture Window, Version 1.1. *List price: $99. Digital Light & Color Inc., Cambridge, MA; 800-577-7090, 617-497-9027; fax, 617-576-1062.*

Circle 411 on reader service card

Inside the SAT: No #2 Pencil Required

It's that time of year again, when high school students seriously consider fleeing the country rather than face the dreaded SAT college-entrance exam. Inside the SAT, from **The Princeton Review Management Corp.**, features test-taking strategy, four practice exams, a 300-word Vocabulary Hit Parade, and detailed lessons on every type of question in the verbal and math sections of the SAT to help unconfident test takers assuage their fears. Based on the Princeton Review

GOOD QUESTION: *Inside the SAT uses humor in the hallway to teach test-taking skills.*

Photography by Thom O'Connor

classroom series, the product emphasizes that the SAT measures test-taking skills rather than intelligence and provides a humorous comic book–style interface to soothe students' nerves. **Inside the SAT.** *Estimated street price: $54. The Princeton Review Management Corp., New York, NY; 800-955-3700 ext. 3335, 212-874-8282.*
Circle 408 on reader service card

ColorMobile Office: One if By Hand, Two if by Sheet

Primax Electronics has introduced the ColorMobile Office color scanner, a modular unit that does both hand-held and sheet-fed scanning. You simply snap on attachments to turn the handheld unit—which is useful for scanning pages of a bound book—into a sheet-fed scanner for handling photographs and other single sheets. Snap on the motor module instead for hands-free image scanning; the trackpad attachment allows you to scan up to A4-size documents.

ColorMobile Office is capable of handling true-color scanning and resolutions of 100 to 400 dots per inch. You can change resolution, image size, and image type via the included Twain-compliant software. With all its attachments, ColorMobile Office weighs a mere 2 pounds; Primax offers the scanner without the attachments for $249.

HANDY-DANDY: *With all the attachments, the scanner weighs only 2 pounds.*

Primax ColorMobile Office. *List price: $329. Primax Electronics, Campbell, CA; 800-388-3693, 408-364-2800.*
Circle 409 on reader service card

Suite Little Deal

Software suites may provide all the modules you'll need for business computing, but packages such as Microsoft Office or Lotus SmartSuite can take up loads of hard disk space and can be difficult to learn. Ability for Windows, from **Ability Plus Software,** is an office suite that contains modules for word processing, spreadsheets, databases, forms, charts, and communications—all with a single interface and command structure. You can launch any of the modules from a set of icons in the Ability Library Manager, a control module where you can also browse, search, or copy any of your Ability files. More important, the OLE 2.0–compliant Ability requires only 20MB of hard disk space. When you change figures in a document, for example, linked spreadsheets or graphs automatically change accordingly. You can fax an open file or export it to a third-party application with a single mouse-click. Ability features an interactive tutorial called Quick Tutor and cheat sheet–style Quickcards to help first-time users master the product.

LITTLE BIG MAN: *The 3.1-pound BJC-70 prints 0.8 pages per minute in color.*

Ability for Windows. *List price: $229. Ability Plus Software, Charlotte, NC; 800-946-4277, 704-364-3346; fax, 704-364-5676.*
Circle 412 on reader service card

HARDWARE BRIEFS

If your IBM PS/2 is collecting dust, you can now upgrade it to 486 power with a $295 Genesis/PC Replacement Motherboard from **PC Enterprises.** There are Genesis boards for use with PS/2 models 25, 25 286, 30 286, and 55SX. Each replacement board uses a Texas Instruments 40-MHz 486 CPU with 1K of internal cache and provides two serial ports, an enhanced parallel port, two 16-bit ISA expansion slots, and sockets for 128K of secondary cache. You can install up to 32MB of memory, and the Genesis provides 256-color SVGA graphics. 800-922-7257.

Upgrade your computer for multimedia with the new Sound Blaster Multimedia Home 4x from **Creative Technology.** This hardware kit is available on the street for about $579 and includes an internal quad-speed CD-ROM drive, a Sound Blaster 16 card, speakers, and a hands-free microphone. The CD-ROM drive provides a 600-KBps maximum transfer rate and a 250-ms access rate. 800-998-5227.

With former New York Giants great Lawrence Taylor at the helm, **Virtual Entertainment Systems** will soon be shipping its 7th Sense virtual-reality entertainment system. Designed for PC-based game playing, the $399 7th Sense comprises a 28-ounce head-mounted display (HMD), an interface card, and bundled game software. The HMD features 360-degree head tracking, stereo sound, external controls, and a built-in microphone. 914-631-9400; fax, 914-631-9487.

ViewSonic Corp., now in partnership with **Optiquest,** has expanded the Optiquest Value Line of monitors with the $699 17-inch Model 1765DC. The new monitor features 0.28-mm dot pitch, a flat-square tube, a nonglare screen, and on-screen digital controls and can handle an 80-Hz refresh rate at a resolution of 1,024-by-768. 909-468-3750; fax, 909-468-3770.

The $395 DrawingSlate II digitizer tablet from **CalComp** features 2,540-line-per-inch maximum resolution, works as either a tablet or a pointing device, measures a mere 0.25 inches in thickness, and weighs only 1.5 pounds. The bundled software now features area mapping, which lets you determine the ratio of tablet area to screen area for precision work, and recordable macros, which let you program the tablet or the buttons of the included pointing tool. 602-948-6540.

Baby-Size Printer Offers Full-Grown Features

It's not as compact and portable as Pentax's Citizen PN60 color printer, but then again, you aren't forced to sacrifice print speed or features, either. The new BJC-70 color printer from **Canon Computer Systems** packs quite a bit of performance into a refreshing design: It measures 2.2 by 11.8 by 6.2 inches (HWD) and weighs 3.1 pounds. It manages 720- by 360-dpi resolution in black mode and 360-by-360 in color; the printer can turn out a full-color sheet in about 75 seconds.

The BJC-70's moisture- and light-resistant inks come in compact cartridges; a single black replacement tank costs $12, and a color tank costs $22. The cartridges are rated for 170 printed monochrome pages and 40 to 50 color pages, while the included nickel-hydride battery will print up to 200 pages on a single charge. You can print on plain or coated paper, cardstock, transparencies, or envelopes, and the printer handles letter-, legal-, and A4-size paper. It even automatically feeds up to 30 sheets and includes 7 built-in bitmap fonts and 20 scalable TrueType fonts.

Canon BJC-70. *List price: $399. Canon Computer Systems, Costa Mesa, CA; 800-848-4123.*
Circle 407 on reader service card

WinBook XP

AT $1999, IT'S THE ONLY SPEEDING TICKET YOU'LL ENJOY PAYING.

Choose the pointing device that works best for you:

TECHNICAL SPECIFICATIONS

- SL-ENHANCED INTEL 486 DX4-75MHZ OR 486 DX4-100MHZ.
- 5 9 LBS. DUAL-SCAN COLOR OR 6.1 LBS OPTIONAL ACTIVE MATRIX COLOR
- DIMENSIONS: 11.3" X 8 5" X 1.7"
- 4MB, 8MB OR 16MB RAM (EXPANDABLE UP TO 32MB)
- 3.5" 1.44MB DISKETTE DRIVE
- REMOVABLE 260 TO 810 HDD
- VGA DUAL-SCAN COLOR OR OPTIONAL ACTIVE MATRIX. MONOCHROME UNITS ALSO AVAILABLE
- 10-CELL NIMH BATTERY & AC PACK
- SUSPEND/RESUME FEATURE
- TWO TYPE II OR ONE TYPE III PCMCIA SLOT
- INTEGRATED DUAL-BUTTON POINTING STICK, OPTIONAL DUAL-BUTTON 19MM TRACKBALL OR OPTIONAL DUAL-BUTTON TOUCHPAD
- PARALLEL, SERIAL AND PS/2 PORTS
- 1MB VIDEO MEMORY WITH EXTERNAL VGA PORT
- LCD FUNCTION INDICATOR PANEL
- 14.4 SEND/RECEIVE FAX/VOICE/DATA MODEM OPTIONAL
- INTERNAL AUDIO OPTIONAL
- DOCKING STATION OPTIONAL

$1999 ..... • Intel 486 DX4-100MHz
• 10.3" dual-scan color display
• 4MB RAM/260MB HD

$4199 ..... • Intel 486 DX4-100MHz
• Active matrix color display
• 16MB RAM/810MB HD
• 14.4 Fax Modem
• DOS and Windows

$$ Comparable savings on all other WinBook XPs—from our base models to notebooks for the power user. For current pricing and configurations, call 1-800-468-0439.

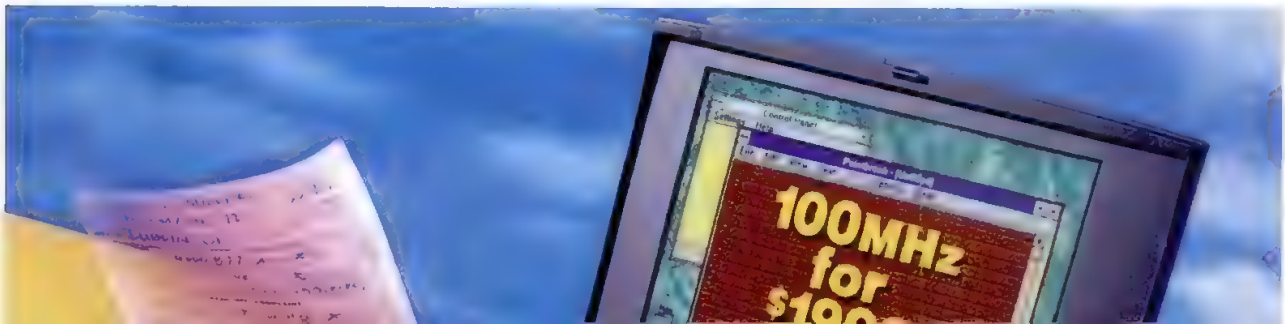
PC MAGAZINE EDITORS' CHOICE
August 1994 WinBook XP
DX2/50 4/280 Monochrome

PC Laptop
Most Improved Portable
January 1995 WinBook XP

APRIL 1995
BYTE
BEST VALUE
486DX4
NOTEBOOK
April 1995 WinBook XP
Best Value 486DX4 Notebook

PC WORLD
February April 1995 WinBook XP
DX2/50 8/295 Monochrome

PC WORLD
February April 1995 WinBook XP
DX4/75 8/125 Dual-scan color



Copyrighted material

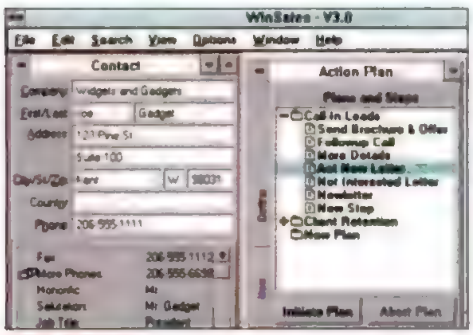
BJC-4000
color printer.

Plus there's brilliant color. The math couldn't be simpler. Canon

DEALER CALL 800 848 4123.

Sales Plans Get Smart

The namesake product from **WinSales,** now in Version 3.0, automates the sales and marketing process via new event-driven triggers. WinSales relies on Smart Plans, which have the ability to



WHOA, TRIGGER: *Smart Plans use event-driven triggers to update your database.*

check the status of other events in a database and update your sales plan accordingly. The product is fully networkable and has a contact manager that provides unlimited customizable fields and a function that lets you construct database queries in plain English. WinSales 3.0 is OLE 2.0–compliant and has MAPI-compliant e-mail and group scheduling.

WinSales, Version 3.0. *List price: Single-user version, $495; five-user network version, $1,495. WinSales Inc., Bellevue, WA; 206-747-2464; fax, 206-747-2955.*

Circle 413 on reader service card

CD-ROM Notebook Packs Pentium Power

Panasonic Personal Computer Co. is shipping the V41 Pentium notebook, which features a 75-MHz Pentium CPU *and* a double-speed CD-ROM drive. The model comes with a 10.4-inch active-matrix display, a 680MB hard disk, and either 8MB or 16MB of RAM (expandable to 32MB). The V41 Pentium also includes 16-bit sound capabilities with MIDI and .WAV support, two stereo speakers, and a microphone.

The V41 Pentium has an internal battery that gives only about an hour of use; a second battery, which ships with the notebook, provides an additional 2 hours. You plug this battery into the notebook's Multimedia Pocket, which also accepts a floppy disk drive (included) or an optional hardware MPEG module that supports full-screen, full-motion video. When the second battery is installed, the unit's weight soars to 9 pounds.

Panasonic V41 Pentium. *List price: With 8MB of RAM, $7,799; with 16MB of RAM, $8,399. Panasonic Personal Computer Co., Secaucus, NJ; 800-742-8086.*

Circle 410 on reader service card

SOFTWARE BRIEFS

Corel Corp. has begun shipping Corel Gallery 2, a CD-ROM–based multimedia file manager that includes 15,000 clip-art images, 500 photos, 500 fonts, 75 sound clips, and 10 video clips. The $99 Gallery 2 is OLE 2.0–compliant and provides basic image-editing features, a clip-art editor, font management capabilities, and a screen-capture utility. It can access any Twain-compliant scanner and lets users create slide shows. 800-772-6735 (U.S.); 800-394-3729 (Canada).

SpinWizard Corporate Edition, from **Tanysis Technology,** lets network managers configure and distribute applications within Windows via the program's rotatable 3-D carousel of icons. Each icon can represent any application, file, or command sequence and can be tailored to the requirements of individual users. SpinWizard CE's Record function lets users record macros and set up icons for one-touch automation. The product lists for $55 per node for 50 or fewer licenses. 800-460-4266, 512-263-1700.

For a low-cost address management tool, check out **Insight Software Solutions'** Smart Address for Windows, Version 2.0. This latest release ($39) features support for an unlimited number of address books, each with up to 6,500 addresses; network support; fields for reminders with advance warning before major appointments or events; powerful search capabilities; and a host of printing options for outputting envelopes, labels, and Filofax pages. 801-295-1890; fax, 801-299-1781.

VisPro/Reports, from **HockWare,** is an object-oriented, 32-bit programmable report writer for OS/2 that leverages the power of the REXX programming language. VisPro/Reports features free-format report drawing, offering the user full control over object placement, font, and color, and support for printing on every type of Avery label. The $199 product has full zooming capabilities, gives you access to data in third-party REXX libraries, and supports banded reports. 919-380-0616; fax, 919-380-0757.

MicroLogic Software is shipping the PrintMaster Gold CD Bonus Pack, which includes the company's entry-level desktop publishing program and a slew of borders, patterns, and clip art. The program also includes templates for greeting cards, banners, certificates, and stationery. A computerized voice instructs beginners in using various features. 800-888-9078.

Multimedia Crosses Platforms with PowerMedia

RAD Technologies has recently introduced PowerMedia, an open-system authoring tool for creating multimedia applications for the Internet, client/server networks, and CD-ROM. PowerMedia features point-and-click development and works across Macintosh, Windows, and Windows NT desktop systems and HP, Silicon Graphics, and Sun workstations. The product is compatible with HTTP and the World-Wide Web, and PowerMedia apps can be scaled to fit any display.

PowerMedia. *List price: Windows version, $995. RAD Technologies Inc., Palo Alto, CA; 800-773-4723, 415-617-9430; fax, 415-473-6876.*

Circle 414 on reader service card

A Monitor Flips Out

When in portrait mode, **Portrait Display Labs'** Pivot 1700 monitor offers more vertical space than a standard 20-inch display, allowing you to see a full letter-size page on-screen. You can pivot the monitor into landscape mode for working on spreadsheets or other horizontally oriented applications; you need not close your current application to pivot the monitor.

SWITCH HITTER: *The Pivot 1700 displays a whole letter-size page.*

The first Pivot 1700 will ship in June with a 0.26-mm dot pitch, and will manage a noninterlaced resolution of 1,024-by-768 at a 76-Hz refresh rate. Portrait Display Labs plans to begin shipping the higher-resolution Pivot 17 Professional in August.

Portrait Pivot 1700. *Estimated street price: $895. Portrait Display Labs, Fremont, CA; 800-858-7744, 510-249-0444; fax, 510-249-0445.*

Circle 415 on reader service card

Drag and Drop? AnyTime

Individual Software is shipping Version 3.0 of its low-maintenance PIM, AnyTime for Windows. This version adds drag-and-drop scheduling, an auto-dial feature, and automatic envelope printing. AnyTime 3.0 prints calendars to fit a number of paper-based organizers and prints to Avery labels. It is networkable and offers repeat scheduling, task prioritization, and warnings of overlapping appointments.

AnyTime for Windows, Version 3.0. *Estimated street price: $24.99. Individual Software Inc., Pleasanton, CA; 800-822-3522, 510-734-6767.*

Circle 431 on reader service card

Here's Something You Don't See Everyday

Introducing the new DeluxScan™ family of high-resolution digital monitors from Hyundai. In 15, 17 and 21-inch screen sizes. Each one packed with the kind of features — and value — you don't see every day.

Like our non-glare, anti-static FST (Flat Square CRT Technology), with Dynamic Focus and INVAR shadow mask. And multiple resolutions from VGA standards to the most demanding applications and environments.

Exactly what you need for consistent, flicker-free edge-to-edge clarity, but without the higher cost you find on other premium monitors.

Let's not forget DeluxScan's ISO-certified ergonomic design. With easy-to-use, digital, front panel controls.

Then there's our Total Green approach to product design, from EPA Energy Star certification and MPR-II-compliance to full DPMS energy efficiency. Every time you turn on the power, DeluxScan turns on the savings.

And there's Hyundai's legendary commitment to quality and customer service. Backed by our extensive warranty, exclusive nationwide 48-hour Express Service and our 60-billion dollar corporation.

	FST SIZE	DOT PITCH	MAXIMUM RESOLUTION	GREEN*
DeluxScan 15	15"	0.28	1024 x 768	✔
DeluxScan 15 Pro	15"	0.28	1280 x 1024	✔
DeluxScan 17	17"	0.28	1280 x 1024	✔
DeluxScan 17 Pro	17"	0.26	1600 x 1280	✔
DeluxScan 21	21"	0.28	1600 x 1280	✔

So next time you think you've seen it all, maybe it's time for another look. DeluxScan: *All the features. Hyundai value.* Something you definitely don't see everyday.

1-800-568-0060

CIRCLE 170 ON READER SERVICE CARD

HYUNDAI
DISPLAY PRODUCTS

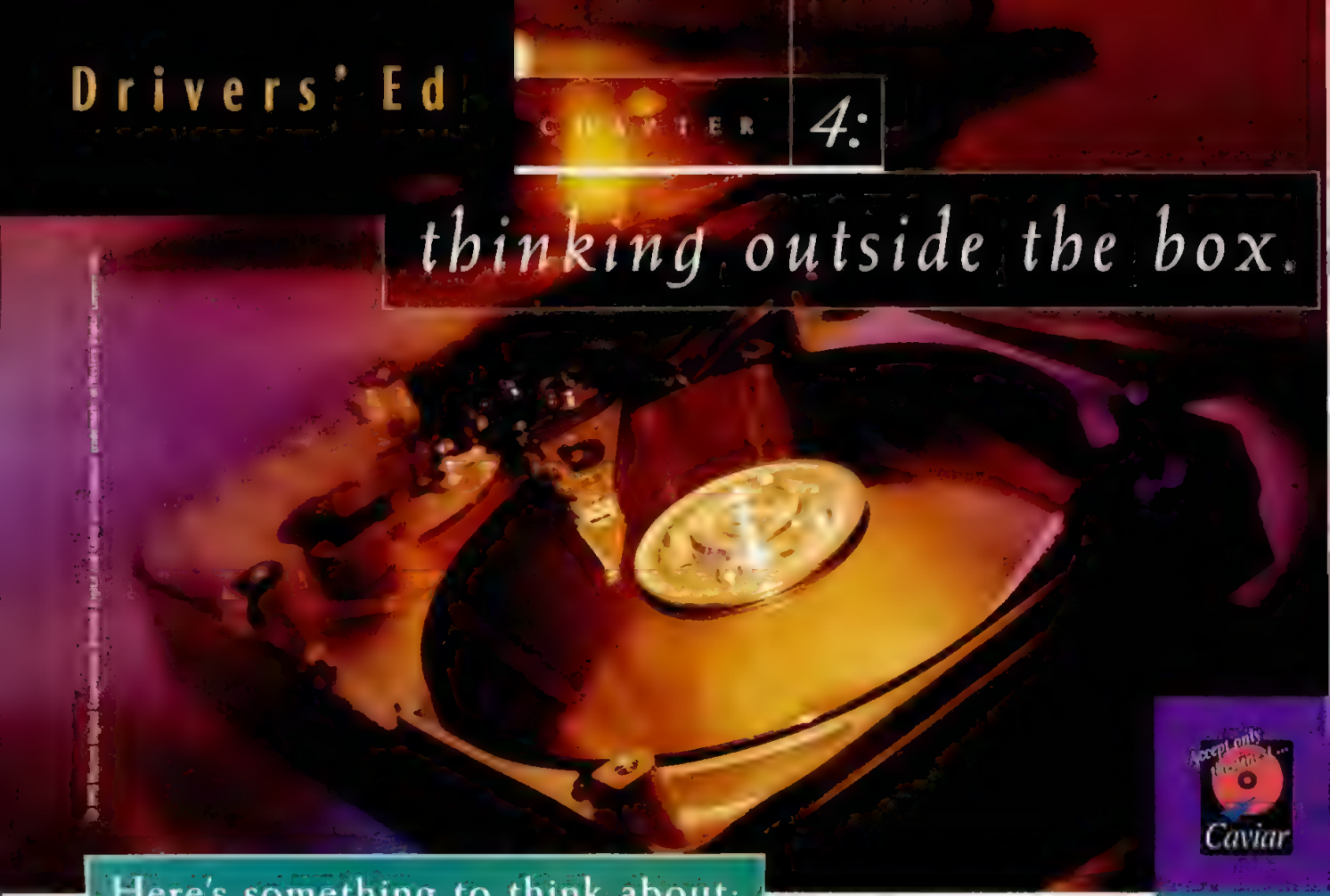
Banana George Blair is 80 years young.

* EPA Energy Star, MPR II and DPMS.
DeluxScan is a trademark of Hyundai Electronics America.

Drivers' Ed

CHAPTER 4:

thinking outside the box.



Accept only the finest ... Caviar

Here's something to think about:

What does it take for a company to engineer hard drives so reliable they can operate for 34 years on average between failures? Or for a company to double the capacity of a 3.5-inch drive within 18 months?

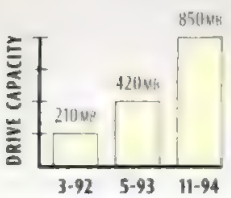
It takes a different way of thinking.

It takes the ability to anticipate the limitations of existing manufacturing processes and the determination to develop new methods. To do this, a manufacturer must be willing to step back and conceptualize bold, new solutions. Western Digital knows this because it's this kind of thinking that enables us to build so much quality, reliability and performance into our entire line of high capacity drives, and still keep them competitively priced

Western Digital realizes you don't spend as much time thinking about hard drives as we do. And we plan to keep it that way

34 YEARS

Mean Time Between Failure



Storage capacity of Western Digital 3½" Drives

Phone: **1-800-832-4778** Internet: **http://www.wdc.com/** DocuFAX: **714-932-4300**

FOR A LIST OF RETAILERS AND DISTRIBUTORS THAT CARRY WESTERN DIGITAL DRIVES, CALL 1-800-832-4778

CIRCLE 237 ON READER SERVICE CARD

WESTERN DIGITAL

Read Only

REVIEWS OF THE LATEST BOOKS FOR THE PC USER

Edited by Tin Albano

MOM Returns for Another Nurturing Visit

BY J.W. OLSEN

Following up on the success of *CD MOM: The Mother of All Windows Books*, Barry Simon and Woody Leonhard have written *PC MOM: The Mother of All PC Books*. The book—which comes with two CDs—tries to explain everything about PCs.

PC MOM pursues the narrow path between boring techie books that take themselves all too seriously and books that try so hard to spoon-feed subjects that all you get is pabulum. At that it succeeds admirably. If you enjoyed the three icon characters who presented distinct perspectives throughout *CD MOM*, you'll love *PC MOM*'s five downright iconoclastic characters who appear far more frequently. Otherwise, their constant presence can be disruptive.

The most distinctive difference between the books is *CD MOM*'s clear focus on Microsoft Windows and *PC MOM*'s broad subject matter spanning hardware and software. If you're new to PC innards, you'll find everything you need to know, from "mom's board" to SCSI to peripherals to monitors to modems. Particularly noteworthy is a computer-ills "survival course."

Software chapters emphasize fun. Fully a third of the book covers arguably the hottest software today: multimedia, "edutainment," and games, plus reference products. *PC MOM* minutely details the DOS operating system and related topics. Not surprisingly, Windows—the subject of the earlier title—is explored only briefly.

The accompanying CD-ROMs are simultaneously a delight and a disappointment. Games addicts will revel in the complete Public Software Library shareware games collection. Curious about utilities like Dashboard, Version 1, Norton FileAssist, or PC Tools File Manager? They're here. Other notables include 4DOS (the acclaimed shareware COMMAND.COM replacement), a standard edition of Shakespeare's works, and Free Phone's 1-800 Telephone Directory.

But while *PC MOM*'s CDs are worth far more than the cover price, we were spoiled by *CD MOM*, which byte for byte offers more useful business tools and software difficult to find on other CDs.

PC MOM surpasses most alternatives in its entertaining explanations of techie PC subjects. But as so often happens with movie sequels, the original was more appealing.

▶ **PC MOM: The Mother of All PC Books,** *by Woody Leonhard and Barry Simon, $49.95. Addison-Wesley, 800-358-4566; ISBN: 0-201-40681-0.*

Circle 450 on reader service card

READ ONLY RECOMMENDS

The Starship Enterprise has been many places on its "five-year mission," and the latest "strange new world" it has entered is cyberspace. Where the Enterprise goes, millions of Trekkies follow. Now, thanks to Michael Wolff's *Net Trek*, Trekkies can easily beam onto on-line Star Trek sites where fellow Trekkies gather, discuss trivia, play games, and chat about the merits of the Star Trek spin-offs. Think of it as your guidebook to an on-going Star Trek convention. $19.00; Random House Electronic Publishing, 800-793-4665; ISBN:0-679-76186-1.

Visual C++ on Paper

BY JAY MUNRO

Microsoft's move to full documentation on CD for Visual C++ 2.0 (MSVC++)has not lessened the need for printed documentation. *The Six-Volume Documentation Collection for Microsoft Visual C++ Version 2.0 for Win32* is the full reference and tutorial for the Microsoft Visual C++ development environment. It lets programmers buy just the paper manuals they need or the whole set.

The set starts with *Microsoft Visual C++ The Users Guide* ($24.95). Programmers familiar with C/C++ programming but not MSVC++ 2.0 will value this guide. *Programming with MFC and Win32* ($24.95) covers the use of the Microsoft Foundation Class (MFC) library and the particulars of programming under Win32 and NT. Volume 3 is the *Microsoft Foundation Class Library Reference* ($44.95).

For the programmer who has mastered the environment, the other volumes cover the complete Win32 development needs in well-laid-out groups. The *Microsoft Visual C++ Language Reference* ($22.95), which is split into C, C++, and preprocessor sections, covers each subject with definitions, details, and examples.

The *Microsoft Visual C++ Run-Time Library Reference* ($22.95) has an easy- to-follow format, with recurring section headings: Function, Return value, Parameters, Remarks, See also, Example, and Output. The last volume is the *Microsoft OLE Control Developers Kit* ($22.95).

CD-ROM documentation is great for fast lookups and may well replace paper. Still, there is no replacement for a solid book by your side. So for now, *The Six Volume Documentation Collection for Microsoft Visual C++ Version 2.0 for Win32* is a must-have for all Microsoft Visual C++ programmers.

▶ **Microsoft Visual C++ Version 2.0: The Six-Volume Documentation Collection for Microsoft Visual C++ Version 2.0 for Win32, $168.70.** *Microsoft Press, 800-677-7377; ISBN: 1-55615-794-0.*

Circle 451 on reader service card

Introducing the new Compaq ProLinea

The original premise was simple: make a powerful, yet affordable, computer that doesn't come with all the headaches normally associated with the word "value." And in creating the latest Compaq ProLinea, we built on that premise—by taking the original apart.

We examined it from top to bottom, from the inside out, looking for ways to improve it. Looking to see what new technologies we could add.

The Latest ProLinea Has An Impressive Save Feature: It'll Save You Money, Save You Time, And Save Your Sanity.

In the end, we came up with more than a few improvements. Making ProLinea even harder to distinguish from more expensive machines. The fastest processors. Easy upgradability. Simplified maintenance. Features that make it easy to live with on the day you install it, and for years to come.

It all raises ProLinea to a completely new level. (Of course you'll still find the price within reach.)

And that should certainly put your mind at ease.

COMPAQ

Traditionally, the phrase "better value" has always meant someone's cut corners to give you a better price. At Compaq, however, we like to take a different approach.

The result is the new Compaq ProLinea: a family of computers that not only offers affordable prices, it pushes technology many steps ahead. Twelve, to be exact:

Number One. Our first improvement is something you'll notice before you even buy a ProLinea. You get to choose the processor you want—from very fast (486DX2/50MHz) to blindingly fast (Pentium/100MHz). This way, you don't have to buy more performance than you really need. And it's designed so that you can upgrade whenever you want.

Number Two. You may be familiar with the new standard bus architecture called PCI. Basically, it improves upon the previous technology by expanding the data path to 32 bits and radically speeding the flow of information to expansion cards and peripherals. And guess what: Compaq has already enhanced this standard with our new TriFlex/PCI architecture—which is built into every ProLinea model.

Number Three. The PCI architecture also boosts the performance of the graphics subsystem. So even if you're working with general productivity applications like word processors and spreadsheets, you can enjoy a crisp, responsive high-resolution display. If your uses demand more, select 586-class models are now available with higher-performance VRAM graphics.

Number Four. Forgive the acronyms, but there's also a PCI local bus IDE interface. This not only pays off in improved disk performance, but it supports up to four storage devices. Which means you can easily add another hard drive, tape backup or CD-ROM drive when needed.

Number Five. As long as we're on the subject of CD-ROM, multimedia ProLinea models now come with our new QuadSpeed drive (along with Enhanced Business Audio). This gives you faster access to the rich and vast references available on CD-ROM today, from national directories to archives of business publications.

Number Six. However large a hard drive may be, there are those who take it as a personal challenge to fill it up. With the new ProLinea PCs, however, we're determined to make that as difficult as possible. You can choose a configuration with a disk capacity of 270MB, 420MB or 720MB. Any of which should put you well ahead of your burgeoning files.

Number Seven. ProLinea comes with 8MB or 16MB of RAM, depending on the model. And you can easily expand it to 136MB or 192MB—enough to take advantage of new 32-bit operating systems, run several programs at once and work with spreadsheets the size of Madison Square Garden.

Number Eight. ProLinea is filled with features designed to make your life

LIKE MOST PC BUYERS, YOU'RE "BETTER VALUE," SO WE'VE CLEVERLY

COMPAQ

easier. It's not only pre-loaded with an extensive online help system and automated setup software, it now has redesigned documentation to help you quickly pinpoint information. It's also optimized to run new operating systems like Windows 95, which will make your future computing easier still. Every model supports the Plug-and-Play standard that will bring a new simplicity to the process of adding expansion cards. (If you add a new network interface card, for example, ProLinea will sense the change and automatically reconfigure its software to support it.)

Number Nine. You decide exactly how expandable you want your ProLinea to be. You can select a desktop model with three expansion slots and three expansion bays or a model with four of each. Or you can choose a five-slot, five-bay mini-tower model that offers maximum expandability without taking up too much of your space.

Number Ten. The new ProLinea PCs have been designed so you can get inside without any special tools. The system board slides out to accept extra memory or a processor upgrade. The hard drive cage swings out so you can swap disks without reaching into inaccessible, finger-bruising areas. And when you snap in a new Compaq hard drive, you won't have to configure any enigmatic jumpers. When you connect the cables, the settings have the good sense to take care of themselves.

Number Eleven. The ProLinea system board now incorporates Flash ROM technology. That means basic system ROM can be updated without major PC surgery. If future system updates should ever become necessary, installing them will be no more difficult than running a software utility and clicking a few buttons on the screen.

Number Twelve. And what about the environment? Using a ProLinea won't by itself repair the ozone layer, but it's certainly a step in the right direction. For the sake of the atmosphere—and everyone who breathes it—our PC manufacturing process is completely CFC-free. And every model is now Energy Star-compliant, which means less wasted energy for the planet and less wasted money on your power bill.

These are the improvements that define our approach to value. (We think you'll agree, it's a lot more rewarding than cutting corners.)

In fact, our new ProLinea does an excellent job of expressing a core belief at Compaq: That is, the smartest way to build better value is to build a better computer.

PROBABLY SICK OF HEARING DISGUISED IT AS 12 IMPROVEMENTS.

Introducing the latest line of ProLinea computers

As with all Compaq PCs, ProLinea is covered by our free 3-year limited warranty. For more information on our full line of Compaq desktop PCs, call us at 1 800 345-1518 or reach us on the Web at www.compaq.com. In Canada, we can be reached at 1-800-567-1616. © 1995 Compaq Computer Corporation. All rights reserved. Compaq and ProLinea registered U.S. Patent and Trademark Office

CIRCLE 137 ON READER SERVICE CARD

A product with one of the highest "You're kidding me" scores ever recorded.

The reaction is almost always the same: you tell someone about this new watch that can read your personal schedule right off a computer screen, and they look shocked for a moment, then shake their heads. "No, c'mon," they protest, "what does it *really* do?"

Well, it's the honest truth. All you need is a Timex Data Link watch and the included software, a PC loaded with Microsoft® Windows™ 3.1 or later, and a CRT monitor. Then just push a few buttons, and hold the watch in front of your monitor. The screen will flash lines of light, and in seconds the watch's electronic eye will read up to 70 entries from the Microsoft and Timex Data Link software: appointments, phone numbers, alarms, to-do lists, birthdays, anniversaries, even locker combinations.

The Timex Data Link watch: it's like science fiction, but without the fiction

The Timex Data Link watch can actually read your personal information right from your computer screen.

Presto, everything is now right there in your watch, as portable as the arm you wear it on.

A week before a birthday or anniversary, a little hand with a string around the forefinger appears on the watch face (*Get outta here!*– no, really, it does) as a reminder icon. Then on the actual day itself, the icon flashes urgently. Or when an appointment nears, the watch beeps to alert you, then tells you who you're supposed to meet, and where.

If this all seems a bit much to believe, we encourage you to examine this remarkable watch with your own eyes, or call 1-800-367-8463 for information. You'll see that everything we've told you is true. Seriously. No lie. Scout's honor. No kidding.

The Indiglo night-light makes sure you're never left in the dark.

TIMEX DATA·LINK

©1995 Timex Corporation. Indiglo is a registered trademark of Indiglo Corporation. Microsoft is a registered trademark and Windows is a trademark of Microsoft Corporation.

CIRCLE 171 ON READER SERVICE CARD

Michael J. Miller

Help! I'm Drowning in Data!

Have you ever tried looking for a specific bit of information on any of the on-line services or on the Internet? If your answer is yes, then you've undoubtedly experienced the frustration of knowing that what you want is available, but buried. Either you don't know how to find it, or you're sick and tired of having to dig through piles of data just to get one helpful piece of intelligence.

Finding what you want on-line isn't going to get any easier. In the coming years, more information will be available on-line. Just look at how quickly World-Wide Web sites are proliferating. But take heart: Help may be on the way.

EDITORS TO THE RESCUE

How are you going to sort through all of this data? Maybe you won't have to. If you read my column regularly, you know that I believe most people will get the bulk of their on-line information through filters or editors, much in the way we now receive information filtered through television, newspapers, and magazines.

In the future, however, you'll be able to customize filters and other on-line editors. Already, PED Software's Journalist program lets you create a customized "electronic newspaper" filled with information you've told the program to pull down from CompuServe or Prodigy. Even better is Personal Journal, a new and customizable electronic version of *The Wall Street Journal*, which lets you pick which companies you want to track and which columns you want to read.

These two products are great, but they're just a first step. There will still be times when you're going to want some information that you haven't predefined or that doesn't come in through your regular channels. That's when you'll need to grab a shovel and once again personally delve into collections of data.

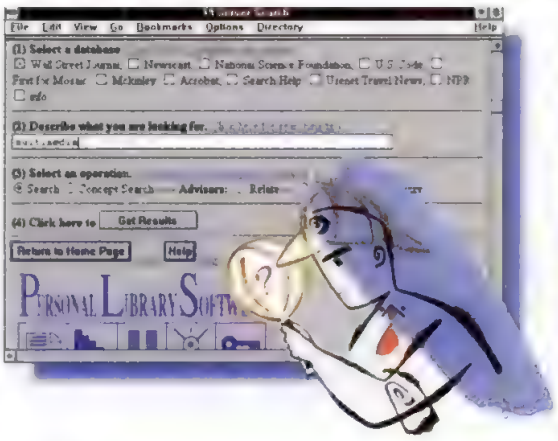
In "Publish Without Paper!" (February 7, 1995), we looked at a number of electronic publishing tools, ranging from hypertext authoring tools designed for use on a LAN to HTML tools for publishing information on the Web. Now we're beginning to see these tools combined to form search engines designed for managing large collections of articles or other data on the Web.

SEARCHING THE WEB

On the Web, search tools grow out of WAIS (Wide-Area Information Server), which is now available in both freeware and commercial versions. WAIS typically runs on a Unix server, but we're beginning to see some versions designed for Windows NT servers. Thus far, it's primarily been a tool aimed mostly at public sites, not commercial ones, but that's changing.

What we need is a tool to help us determine which data is really relevant to what we're looking for. Why? Because the problem with a large collection of documents is that it's too easy to find too many answers to any query you can come up with. Search engines are now being designed to go beyond simple, broad-band searches.

One of the best approaches is used by Topic, from Verity. Topic has been a popular search engine used in a variety of products, such as Lotus Notes 3.0 and Adobe Acrobat 2.0. It uses both keywords and information searching to come up with a ranking of how relevant each document is to what you are searching for. You might get back a list of a hundred documents that match your criteria, but they would be listed in order of the relevance that Topic assigns. (For a demo, go to *http://www.verity.com*.)



On-line search engines will help us find the most relevant information on the Internet.

A different approach is offered by Architext, which uses what it calls *context-based* searching. Architext lets you enter a

Illustration by Steven Salerno

query and then comes up with the data you want based on the content of the documents themselves. It tries to figure out the content of the documents based on the context that the words are in. The result is that Architext's system will find stories that don't have any of the words in your search, but that do have the same general meaning. For instance, you might look for "presidents" and find an article that references "Bush and Clinton." In theory, it won't find things with the right words but the wrong meaning. This engine probably won't be right for everyone, but its approach is certainly interesting. (Check out the demo at *http://home.mcom.com/MCOM/search_docs/index.html.*)

Oracle wants to be the big database for documents and multimedia elements on the Internet, and it already has a variety of products available. The most compelling is Context, which can go through a variety of documents and create its own summary, pulling about three key sentences from each of the documents it selects. (You can check out a demo at *http:// www.oracle.com.*)

There are other approaches to letting you search for data on the Web or on other wide-area networks. Personal Library Software now has an Internet version of its Personal Librarian called PLServer. (A demo is available at *http://www.pls.com.*)

When it comes to organizing your information, Lotus isn't about to be left out. The company is developing a group of products, collectively known as InterNotes, that will let you access Internet newsgroups from within Lotus Notes.

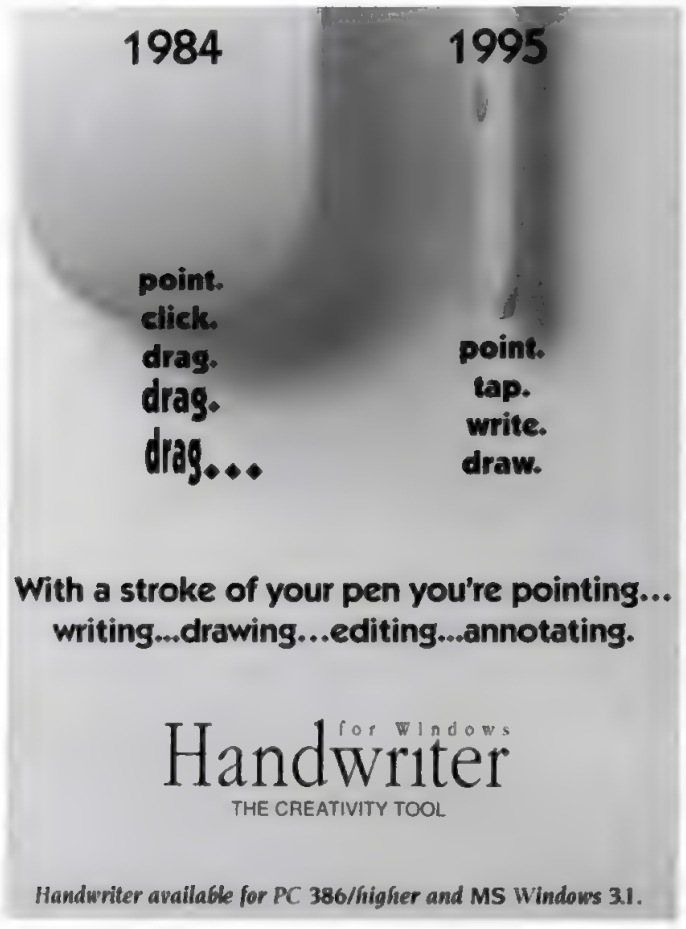
InterNotes products will also let you turn Notes databases into HTML documents that can be published on the Web. (For more info, see the sidebar "Lotus Ties Notes to the Internet" in this issue's story "The Internet Means Business.")

Folio Corp., which makes Folio Views—our Editors' Choice among LAN-based hypertext publishing tools—is getting in the act with an Internet version of Folio Views that lets you publish your "infobases" on the Internet and search those documents with things like relevance-based search tools. This product is more oriented toward corporate databases, not commercial publishers. Folio Views does, however, show us how much easier it's going to be for people to become publishers of large amounts of data. (Take a look at *http://www.folio.com.*)

Folio has developed a relationship with the Copyright Clearance Center (which represents most major publishers), so that companies that want to place documents or articles on a corporate server will be able to let employees search for those documents legally.

Both Folio and Lotus seem primarily aimed at companies who want to publish corporate data for their own customers, while many of the other products seem aimed at people who want to publish a lot of information for the general public.

Turning our PCs into intelligent information appliances capable of finding the data we need will involve combining the features of many of these products—from hypertext systems and indexing programs to electronic- document packages, browsers and communications packages, intelligent agents, and multimedia databases. We have a long way to go, but getting there is crucial if we're going to find that one piece of information in the huge collection of data that will be available. □

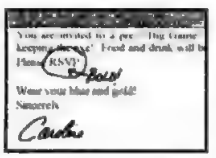


Handwriter®
The Innovative Input system, complete with software and hardware. It's fast and fun-to-use, according to thousands of happy Handwriter users and numerous magazine reviewers.

Handwriter® Empowers You.
Equipped with CIC's award-winning handwriting recognition software, it makes using your PC more "natural," whether you're writing notes, editing in a word processor, using a spreadsheet, drawing or desktop publishing. Handwriter allows you to maximize your productivity and creativity.

Ideal Security.
Handwriter is so smart that it can even recognize your signature as a password for your screen saver.

***New* Groupware Features**



With cc:Mail, MS Word, and WinFAX Pro, you can annotate documents over the network and personalize them with your very own signature!

Better Health & Comfort
56% of all OSHA reported injuries are RSI, or Repetitive Stress Illnesses. Never heard of **RSI** from using a pen, have you?

Handwriter® is the ultimate complement to your keyboard.

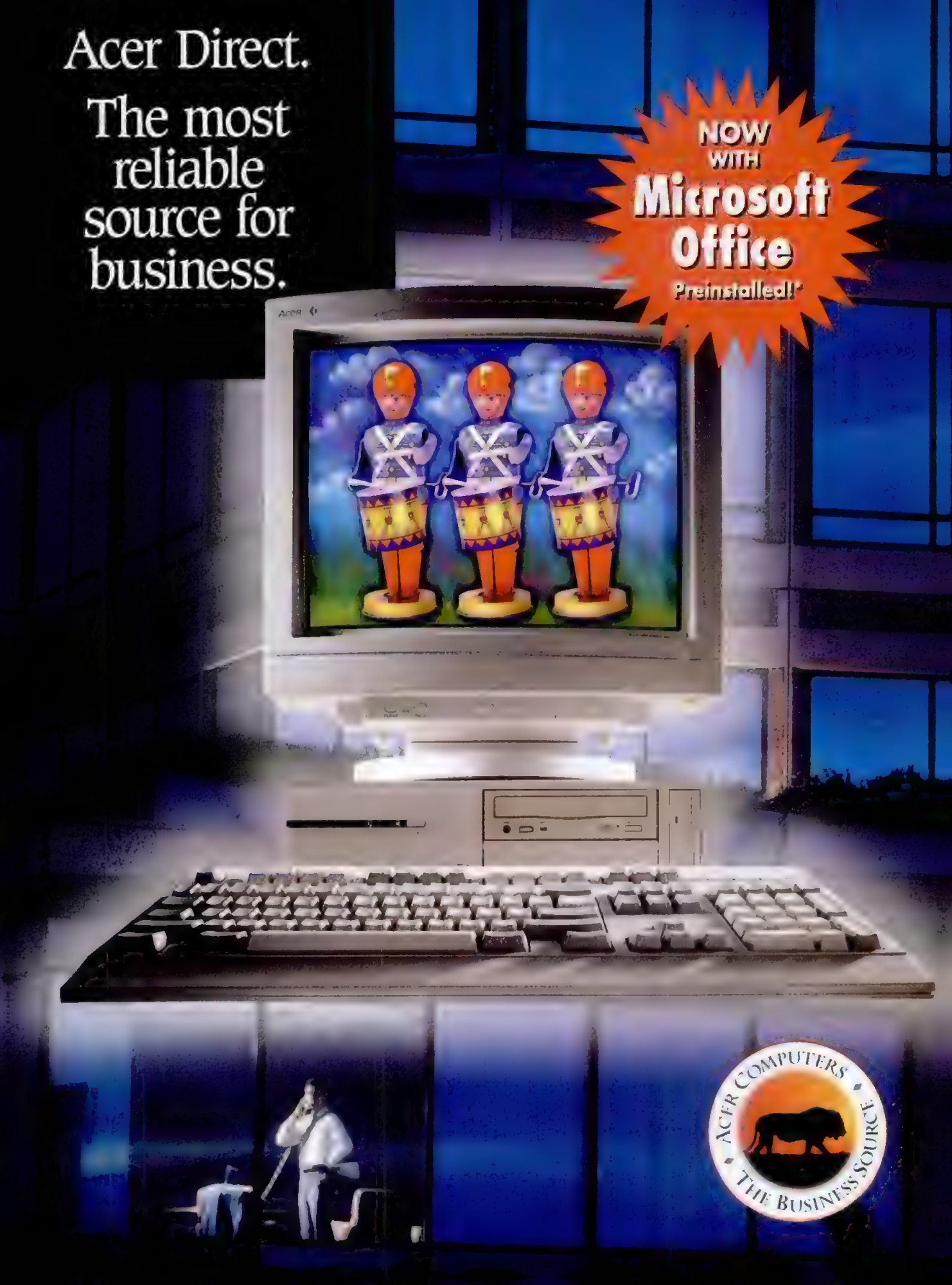
Handwriter for Windows
Version 1.7
Includes:
- *New* YPad™ note-taker
- *New* Handwriter® Recognition System
- *New* SVGA support
- *New* DOS mouse driver
- Screen saver with Signature Verifier
- Crossword puzzles
- MS Pen Extensions for Windows
- State-of-the-art cordless electronic pen
- Ultra-thin tablet with a 10 ft. cord that plugs into your serial port

All this for under $280.

Don't Be A drag Order Today!

PC Zone:
800-248-0800
Tiger Direct:
800-888-4437
CDW:
800-800-4CDW
Resellers Call
800-426-9787

CIC. Communication Intelligence Corporation
Redwood Shores, CA


Acer Direct.
The most reliable source for business.
NOW WITH
Microsoft Office
Preinstalled!*
ACER COMPUTERS
THE BUSINESS SOURCE

FOR THE CORPORATE

AcerPower™ Pentium™/100MHz
Minitower

- **Intel® 100MHz Pentium Processor**
- 8MB System RAM (Expandable to 128MB)
- 256KB Second-Level Cache
- 1.2GB IDE Fast Hard Disk Drive
- PCI Enhanced Local Bus IDE
- **Quad-Speed CD-ROM Drive**
- **2MB VRAM Diamond Stealth 64 PCI Accelerator Card**
- 1.44MB Diskette Drive
- 4 PCI 32-Bit Expansion Slots, 4 ISA 16-Bit Slots (1 Combination PCI/ISA Slot)
- Flash BIOS
- High-Speed I/O Ports
- Microsoft® Windows™ for Workgroups, MS-DOS® 6.2
- **Microsoft Office v4.2**
- 3-Year Limited Warranty with First Year On-site
- 15" .28mm Non-interlaced Flat Screen Color Monitor†

$2,945
Business Leasing Available
0495DIR21

AcerPower Pentium 100MHz
Minitower

- **Intel 100MHz Pentium Processor**
- 16MB System RAM (Expandable to 128MB)
- 256KB Second-Level Cache
- 1.2GB IDE Fast Hard Disk Drive
- **Quad-Speed CD-ROM Drive**
- **4MB VRAM Diamond Stealth 64 PCI Accelerator Card**
- 1.44MB Diskette Drive
- 4 PCI 32-Bit Expansion Slots, 4 ISA 16-Bit Slots (1 Combination PCI/ISA Slot)
- Flash BIOS
- High-Speed I/O Ports
- Microsoft Windows for Workgroups, MS-DOS 6.2
- **Microsoft Office v4.2**
- 3-Year Limited Warranty with First Year On-site
- 17" .28mm Non-interlaced Flat Screen Color Monitor†

$3,795
Business Leasing Available
0495DIR20

AcerPower Pentium 75MHz
Minitower

- **Intel 75MHz Pentium Processor**
- 8MB System RAM (Expandable to 128MB)
- 256KB Second-Level Cache
- 850MB IDE Fast Hard Disk Drive
- **Quad-Speed CD-ROM Drive**
- **2MB VRAM Diamond Stealth 64 PCI Accelerator Card**
- Flash BIOS
- High-Speed I/O Ports
- 1.44MB Diskette Drive
- 4 PCI 32-Bit Expansion Slots, 4 ISA 16-Bit Slots (1 Combination PCI/ISA Slot)
- Microsoft Windows for Workgroups, MS-DOS 6.2
- **Microsoft Office v4.2**
- 3-Year Limited Warranty with First Year On-site
- 15" .28mm Non-interlaced Flat Screen Color Monitor†

$2,645
Business Leasing Available
0495DIR22

AcerPower Pentium 75MHz
Desktop

- **Intel 75MHz Pentium Processor**
- 8MB System RAM (Expandable to 128MB)
- 256KB Second-Level Cache
- 540MB IDE Fast Hard Disk Drive
- PCI Enhanced Local Bus IDE
- Double-Speed CD-ROM Drive
- 1MB 64-Bit PCI Local Bus Video
- 1.44MB Diskette Drive
- 2 PCI 32-Bit Expansion Slots, 3 ISA 16-Bit Slots (1 Combination PCI/ISA Slot)
- Flash BIOS
- High-Speed I/O Ports
- Microsoft Windows for Workgroups, MS-DOS 6.2
- **Microsoft Office v4.2**
- 3-Year Limited Warranty with First Year On-site
- 15" .28mm Non-interlaced Flat Screen Color Monitor†

NEW

$2,195
Business Leasing Available
0495DIR10

AcerPower IntelDX4™/100MHz
Desktop

- IntelDX4/100MHz Processor
- 8MB System RAM (Expandable to 64MB)
- 540MB IDE Fast Hard Disk Drive
- 1MB Local Bus Video
- 1.44MB Diskette Drive
- 4 ISA 16-Bit Slots
- Flash BIOS
- High-Speed I/O Ports
- Microsoft Windows for Workgroups, MS-DOS 6.2
- **Microsoft Office v4.2**
- 3-Year Limited Warranty with First Year On-site
- 15" .28mm Non-interlaced Flat Screen Color Monitor†

$1,895
Business Leasing Available
0495DIR00

†Monitors are protected by a one-year warranty.

SUITE.

Acer Direct Sales Team Is Business-Savvy!

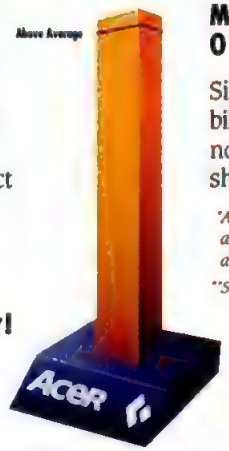
If you need help determining the right mix of business PC power, call Acer Direct. Our sales managers are experts in outfitting specific business models with the right mix of Acer PCs, third-party software, even suggestions for peripherals and communications! Just tell us your goals and basic requirements, and we'll suggest configurations that will get the job done...while staying neatly within your budget guidelines.

Microsoft Office Preloaded

All AcerPower desktops and minitowers from Acer Direct come with industry-standard Microsoft Office preinstalled.* Microsoft Office combines Word, PowerPoint, Excel and Mail in one package. You're productive from the first time you boot up!

Choose Acer For Reliability

When it comes to PCs you can count on, Acer Direct delivers the goods. Our commitment to quality and high manufacturing standards was rewarded with high marks in the *PC World Magazine Reliability and Service Ratings*, published in November 1994. While Acer PCs got an above average rating in product reliability, other direct PC companies didn't quite make the grade.



PC World Magazine Reliability and Service Ratings

Source: PC World, November 1994

Three-Year Warranty!

Acer desktops and minitowers are protected by a three-year limited warranty on most configurations. Call Acer Direct for the details.

Satisfaction Guaranteed!

If you're not happy with your Acer Direct purchase within 30 days, we'll solve the problem to your satisfaction... or you'll get a full refund!

Make The Smart Decision, Opt For Acer.

Since 1976, Acer has grown to a $3.2 billion computing powerhouse that's now among the top ten in units shipped worldwide!**

**Acer preinstalls Microsoft Office v4.2 on all AcerPower and AcerNote products with at least 8MB of RAM and a hard drive.*

***Shipping statistic courtesy International Data Corp.*

American Express Cards Welcome · VISA · MasterCard · LEASING

Call 800-848-ACER

When calling, please reference #055 ACD.
Specifications and pricing are subject to change.
Prices valid through May 31, 1995.

Monday through Friday 6 AM-6 PM and Saturday 8 AM-4 PM Pacific Time
Acer computers are also available at fine retailers and resellers.

Acer®

Please call 1-800-848-ACER for details on the money-back guarantee, limited warranty and International Travelers Warranty. Return shipping and insurance charges are the responsibility of the customer. Not available in Canada. On-site service may not be available in certain remote locations. Products, availability, prices and programs are subject to change or cancellation without notice. Shipping and handling charges are extra. Acer, AcerAcros and the Acer logo are registered trademarks and AcerNote, AcerPower, AcerView, ChipUp and SmartCase are trademarks of Acer America Corporation and Acer Inc. Intel and the Intel Inside Logo are registered trademarks and Pentium and the Pentium Processor logo are trademarks of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. ©1995 Acer America Corporation. All rights reserved.

FOR EXECUTIVES ON

AcerNote i486DX2™/50MHz

i486DX2/50MHz Processor with Built-In 8KB Cache and Coprocessor
4MB System RAM (Expandable to 20MB)

- **9.5" Active-Matrix LCD Displays 256 Colors**
- **Easily Upgradable 500MB 2.5" Hard Disk Drive**
- **Bundled with a 14.4 PC Card Data/Fax Modem**
  2 PCMCIA Type II/1 Type III Slot
- **Ergonomic Palmrest with Integrated EasyTrac Trackball**
  1.44MB Diskette Drive
  Suspend-to-Disk Feature, "No Reboot" CMOS Setup and Suspend/Resume Hot Button Preserves Battery Life
  Simultaneous LCD/CRT Display
  Slim 8.66" x 11.4" x 2.1" Case Weighs 6.4 lbs, Including NiMH Battery
  MS-DOS 6.2, Microsoft Windows 3.1 and Productivity Pack, Personal Organizer, Epic Pinball Software Included
  One-Year, 24-Hour "Hot Swap" Warranty in U.S. and Canada

$2,799 0495DIR32
Business Leasing Available

AcerNote i486DX2/50MHz

i486DX2/50MHz Processor with Built-In 8KB Cache and Coprocessor
4MB System RAM (Expandable to 20MB)

- **9.5" Active-Matrix LCD Displays 256 Colors**
  Easily Upgradable 340MB 2.5" Hard Disk Drive
  2 PCMCIA Type II/1 Type III Slot
- **Ergonomic Palmrest with Integrated EasyTrac Trackball**
  1.44MB Diskette Drive
  Suspend-to-Disk Feature, "No Reboot" CMOS Setup and Suspend/Resume Hot Button Preserves Battery Life
  Simultaneous LCD/CRT Display
  Slim 8.66" x 11.4" x 2.1" Case Weighs 6.4 lbs, Including NiMH Battery
  MS-DOS 6.2, Microsoft Windows 3.1 and Productivity Pack, Personal Organizer, Epic Pinball Software Included
  One-Year, 24-Hour "Hot Swap" Warranty in U.S. and Canada

$2,499 0495DIR31
Business Leasing Available

AcerNote™ IntelDX4™/75MHz

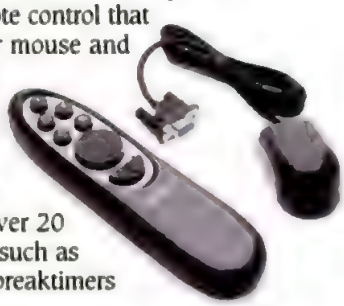
IntelDX4/75MHz Processor with Built-In 16KB Cache and Coprocessor
8MB System RAM (Expandable to 20MB)

- **9.5" Active-Matrix LCD Displays 256 Colors**
  Easily Upgradable 500MB 2.5" Hard Disk Drive
  2 PCMCIA Type II/1 Type III Slot
- **Ergonomic Palmrest with Integrated EasyTrac™ Trackball**
  1.44MB Diskette Drive
  Suspend-to-Disk Feature, "No Reboot" CMOS Setup and Suspend/Resume Hot Button Preserves Battery Life
  Simultaneous LCD/CRT Display
  Slim 8.66" x 11.4" x 2.1" Case Weighs 6.4 lbs, Including NiMH Battery
  MS-DOS 6.2, Microsoft Windows 3.1 and Productivity Pack, Personal Organizer, Epic™ Pinball Software Included
- **Microsoft Office v4.2**
  One-Year, 24-Hour "Hot Swap" Warranty in U.S. and Canada

$3,299 0495DIR33
Business Leasing Available

Presentation Power From Across The Room!

The new ***Mind Path™ Remote Control*** is a powerful, lightweight, inexpensive remote control that combines total control of your mouse and keyboard from up to 45 feet away with dramatic special effects that add flair to any presentation, training, or demonstration. Includes free Presentation F/X software, over 20 remote control special effects such as zoom, telestrator, spotlights, breaktimers and sound.



$149
Available only with the purchase of an AcerNote.

THE GO.

AcerNote IntelDX4/75MHz

- **IntelDX4/75MHz Processor with Built-In 8KB Cache and Coprocessor**
- 4MB System RAM (Expandable to 20MB)
- 9.5" Dual-Scan LCD Displays 256 Colors
- Easily Upgradable 340MB 2.5" Hard Disk Drive
- 2 PCMCIA Type II/1 Type III Slot
- **Ergonomic Palmrest with Integrated EasyTrac Trackball**
- 1.44MB Diskette Drive
- Local Bus Accelerated Graphics
- Easy-to-Remove Keyboard for Quick Memory and BIOS Upgrade
- Suspend-to-Disk Feature, "No Reboot" CMOS Setup and Suspend/Resume Hot Button Preserves Battery Life
- Simultaneous LCD/CRT Display
- Slim 8.66" x 11.4" x 2.1" Case Weighs 6.4 lbs, Including NiMH Battery
- MS-DOS 6.2, Microsoft Windows 3.1 and Productivity Pack, Personal Organizer Software Included
- One-Year, 24-Hour "Hot Swap" Warranty in U.S. and Canada

$1,999

0495DIR30

Business Leasing Available

Expandability For Tomorrow, Power For Today

The AcerNote portable computer series gives you all the expandability, plus more power than many current desktop PCs. The high performance of the IntelDX4/75MHz processor, combined with local bus architecture, gives you the power to take all your projects on the road with you, not just the less-demanding ones.

Acer protects AcerNote owners with the three-year International Travelers Warranty. If you experience a problem while on the road with an AcerNote, we'll get you a replacement within 24 hours! This pledge is honored in any of the 30 countries where there's an Acer sales office!

Modularity For Your Notebook

Convenient, upgradable architecture has arrived with the AcerNote series. It features a revolutionary modular design that makes upgrading components and servicing easy. That's important, because when you're traveling with your notebook, your system administrator won't be around to help you.

ACER COMPUTERS • THE BUSINESS SOURCE •

Cards Welcome

VISA

LEASING

Call 800-848-ACER

Monday through Friday 6 AM-6 PM and
Saturday 8 AM-4 PM Pacific Time
Acer computers are also available at fine retailers and resellers.

Acer®

When calling, please reference #055 ACD. Specifications and pricing are subject to change.
Prices valid through May 31, 1995.

CIRCLE 034 ON READER SERVICE CARD

NEW QUATTRO PRO 6.0 FOR WINDOWS

Why is it there's never been a spreadsheet that works like WordPerfect?

All-new Quattro® Pro 6.0. Designed to work with numbers. Designed to work with WordPerfect.*

It's a question millions have asked. "Which spreadsheet works best with WordPerfect?" The answer—new Quattro Pro.

Look at the menus and toolbars. They're the same as in WordPerfect. Dialog boxes (like "File Open") are the same, too. And thanks to PerfectFit™ Technology, even automation tools like Experts and Coaches™ are the same. It's just like using one program.

But the best part is this. The programs are built to work together. You can simply drag a Quattro Pro spreadsheet and drop it into a WordPerfect document. Then edit it right there—without switching applications. You can't do that with 1-2-3.†

PerfectFit with PerfectOffice

Quattro Pro is fully integrated with WordPerfect and the other products in our PerfectOffice suite.

Only Quattro Pro gives you the perfect combination of spreadsheet power and stunning graphics. Plus the same world-class, toll-free support as WordPerfect.*

So visit your local reseller. Or call 1-800-526-5064 to order. Because when you're working with WordPerfect, nothing works like Quattro Pro.

Quattro® Pro

NOVELL.

THE PERFECT PLACE TO WORK™

*Support is six months of free, toll-free support. Subject to change without notice. ©1995 Novell, Inc. All rights reserved. Novell, the N-design logo, Quattro and WordPerfect are registered trademarks of Novell, Inc. The NetWare logotype (teeth logo), PerfectOffice, The Perfect Place to Work, PerfectFit and Coaches are trademarks of Novell, Inc. †1-2-3 is a registered trademark of Lotus Development Corp.

Bill Machrone

Taste vs. Technology

As Immanuel Kant once remarked, *"De gustibus non est disputandum"* (there is no disputing taste). Nowhere is this more true than with user interfaces, keyboards, and pointing devices. Subjectivity rules. But as Ayn Rand said, "Check your premises."

You may think that you've got the perfect setup, but unless you try alternatives, you may find that you've been shortchanging yourself, sometimes in unexpected ways.

Technological improvement is relentless, as is the study of ergonomics. The latest mice from Microsoft and Logitech aren't just different, they're better. You can use them longer, with less fatigue. The configuration programs offer more adjustments and tailoring to your preferences than they did in the past. If you're still using an original "Dove bar" mouse, gone all grimy around the edges, and with the original driver software, you need to check out the newer models and thoroughly explore the settings available in the Control Panel. You may find that some of the newer options, such as cursor growth, mouse trails, and acceleration make your job easier.

I've been testing a lot of new laptops lately, and I've developed a preference for the ones with the eraser-head pointing devices because the keyboard is generally more compact and I have to perform fewer contortions to move the cursor. My everyday machine is a Gateway HandBook, and every time I come back to it from one of these other machines I notice how sloppy its pointing stick feels. In fact, I had started to avoid using it, preferring to use Alt sequences and the cursor keys. As I was using it last night, I realized that most of the mechanical energy I was putting into pointing was being absorbed by the stick's rubber cover. It had gotten spongy and soft over more than a year of use, and I had compensated both in the way I pressed it and the settings in the Control Panel.

I found a piece of firm rubber in the basement that was roughly the right shape and size, trimmed it with a razor blade, drilled a hole in the bottom, and sanded it to the right shape. I made mine a little broader on top than the original and gave it a slight, fingertip-fitting concave instead of the original's convex shape. What a difference! I felt as if I was using a new Toshiba or IBM notebook instead of this well-worn Gateway.

Are you still struggling with File Manager/Program Manager? You owe it to yourself at least to try The Norton Desktop or Dashboard. Feeling bold? Try OS/2 Warp and find out where Microsoft got some of the good ideas that are going (eventually) into Windows 95. You also get the benefit of real multitasking and, for most users, greater robustness.

While other things are getting better, most keyboards are just getting cheaper. The average keyboard is junk, lacking the tactile feedback, structural rigidity, or smooth action that makes for effortless typing. Old IBM/new Lexmark keyboards are by far the best overall, far superior to the cheapo garbage that comes with most machines. Laptop keyboards are just as variable. Many keyboards are too stiff—a waste of energy and a source of fatigue. Some are so light that they feel flimsy. A few are just right. The new IBM 701C "Butterfly" has unquestionably the best keyboard I've ever used on a laptop, even better than the excellent Texas Instruments keyboards.

Finally, watch new users—do some active listening. A friend recently moved to Windows applications from character-mode WordPerfect and commented on how sensitive the mouse was; she barely needed to touch it. What sounded like a compliment was actually a complaint. So we twiddled the sensitivity and acceleration controls, which had been turned all the way up so that it was nearly unusable. New technology suddenly became far more tenable to her. How about you? □

How good is your setup? You may be shortchanging yourself.

Illustration by Carolyn Fisher

General Motors.

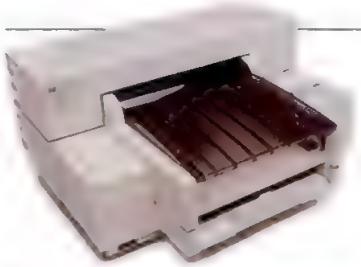
"The reasons we believe in Daytime Running Lamps are obvious."

You're driving in broad daylight. Suddenly, a car's lights catch your eyes. They could be our new daytime running lamps (DRLs). These special low-intensity headlights help alert other drivers with light, like your car horn can alert them with sound, according to Jay Minotas, a member of General Motors' safety team. They're simple, practical, and easy to use because they come on automatically. And research shows they reduce collisions, and that can help save lives. GM is introducing daytime running lamps in 1995, and they'll be shining on all its vehicles by 1997. Right now, no other domestic auto company offers them. Jay says he hopes that will change: "The sooner every car and truck has DRLs, the safer we'll all be."

Bill Machrone

Second Looks

LIVING WITH THE PRODUCTS WE REVIEW



HP's Color Dulled by Drivers

Hewlett Packard's HP DeskJet 500 series color printers have been a hit at *PC Magazine* since day one, garnering several Editors' Choices. But driver problems have made performance, over long-term use, less than sparkling.

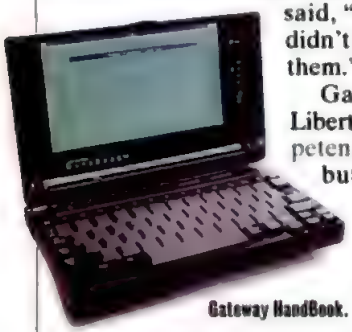
Printing in color from Windows is a complex ballet of application software, the printer driver, and even the video driver. Users have experienced a number of bugs and GPFs, often caused by the DeskJet 500's interactions with applications. The Version 5 drivers fixed the bugs in the previous version but introduced bugs of their own. One user's "magic" solution was to install the Version 5 driver, then reinstall Version 4.

You can find the drivers on CompuServe's HP support forum (Go HP). D5W3US.EXE is the file for Version 5; D5WN31.ZIP is for Version 4.1. You should also read WINPRT.DJ5 for tips on solving Windows printing problems.

By the way, DeskJet 550C and 560C printers manufactured from June 1993 through March 1994 had paper-feed problems. The fix-it kit is an abrasive pad and a software utility that spins the rollers. If you are having paper-feed problems, contact HP at 800-656-2324.

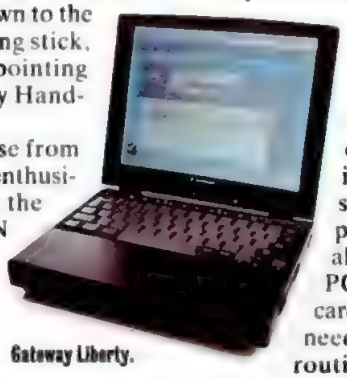
A Sad Farewell to Gateway's HandBook

I was disappointed to hear that Gateway 2000 has discontinued the HandBook (First Looks, December 21, 1993), so here is a second (and last) look at the subnotebook. I've had a HandBook for a year and a half, and it's become part of my life. Those of us who prize light weight and small size above all else have loved the HandBook, but as a Gateway rep said, "You guys just didn't buy enough of them."



Gateway HandBook.

Gateway's new Liberty is a very competent subnotebook, but for me, it's a HandBook on steroids. Gateway actually plans to market the Liberty as a portable that fills the niche between notebooks and subnotebooks. The Liberty's keyboard is identical to the HandBook's, right down to the EZ Point pointing stick, except that the pointing isn't as EZ as my HandBook.



Gateway Liberty.

Early response from Liberty users is enthusiastic. They love the big 10.4-inch STN display, even though it may not have the crispness of a TFT screen. The reduced off-axis viewing angle gives you a modicum of privacy when you're using it in public places.

The Liberty's DX4/100 blows the 486/25 HandBook into the weeds, and the 540MB hard disk is about the biggest one you can get in a notebook. The Liberty's battery runs for a little more than 3 hours, which is fine for a machine of this power and weight. I miss the compactness of the HandBook, but the power of the Liberty is seductive.

How to contact Second Looks: On ZiffNet type GO ZNT:EDITOR, and choose Views: Machrone. Contact Machrone directly via MCI Mail at Wmachrone or CompuServe at 72241,15. You can also find us on the World-Wide Web at *http://pcmag.ziff.com/~pcmag*.

OS/2 Warp Is Oh So Close

In my extended "conversation" with OS/2 Warp users, I've uncovered pockets of frustration that offset the euphoria experienced by most. Judging from my e-mail, I estimate that perhaps 2 percent of the people who try Warp are utterly unsuccessful. The successful ones are sure that the number is much lower; the unsuccessful ones are sure it's much higher.

I had to wait a long time for video drivers so I could use OS/2 in modes other than 640-by-480; other users simply swapped their cards for ones like the ATI Mach 64, known to work well with OS/2. When it comes to CD-ROM support, however, there doesn't seem to be any gray area between "works great" and "hosed."

The folks at IBM are providing a terrific amount of software at a very reasonable price, but they're going to have to sweeten the deal even more to gain market share. They need to include full client-side networking support: TCP stacks, IPX, NFS support, and drivers for all the plug-in and PCMCIA network cards out there, and they need a killer installation routine. Look for OS/2 Warp Connect to address some of these issues.

Lastly, phone support is getting better, but the best place is still CompuServe's OS2SUPPORT Forum.

LOOKING AHEAD

Tell me what you love and hate about these products and we'll share the information in future issues.

Autodesk 3D Studio	Quicken for Windows
IBM ThinkPad 755CD	Vertisoft Remove-It
LANtastic for OS/2	Toshiba Portege T3600CT
Lotus Organizer 2.0	WordPerfect 6.1
PCMCIA modems	ZDS Z-NoteFlex

Photography by Thom O'Connor

I Want Power, Features And Reliability.

You Got It.

intel inside

Copyright © 1995 Zenith Data Systems Corporation. Zenith Data Systems is a Bull company. Z-NOTEFLEX, FLEXSHOW, FLEXDOCK and "Make The Connection" are trademarks of Zenith Data Systems Corporation. Central Point Software, Inc. *Figure based on two-battery configuration. Battery life depends on applications used, power management features selected and peripherals attached. **Optional accessories.

I Want It All.

Z-NOTEFLEX.

POWER

High-speed processors to 100MHz

Large TFT and passive color LCDs

High-capacity 700+ MB hard drives

Fast local bus video and hard drives

Up to 6.5 hours of battery life*

FEATURES

User-upgradable CPU, HDD and LCD

Swappable floppy for second battery

Lockable modular components

Integrated 16-bit audio

Two Type-II PCMCIA slots†

Integrated pointing device with over-sized buttons

FLEXDOCK™ enhanced port replicator with networking and expansion capabilities

FLEXSHOW™ multimedia accessory unit with double-speed 5.25" CD-ROM drive

RELIABILITY

PC Tools™ anti-virus software loaded

24 hr-7 day toll-free customer support

3-yr limited warranty (first year on site)

If you have a number of needs, look to the computer that offers a number of solutions. Z-NOTEFLEX.™ It's what you want in a notebook.

1-800-945-0673 Ext. 5171

ZENITH DATA SYSTEMS

Make The Connection™

IntelDX4 is a trademark and the Intel Inside logo is a registered trademark of Intel Corporation. PC Tools is a trademark of
†Additional Type I, Type II and Type III PCMCIA slots are available with optional modules. Specifications are subject to change

ZEOS®: Sweet Deal VS. Toshiba: No Big Deal.

Unretouched screen photos

	ZEOS Meridian™ 400A	Toshiba Portégé™
486DX2-50	$3295	$3399*
DX4-100	$3695	Not Available
Features		
Size	➤ 7.8" x 10.2" x 1.7"	➤ 7.9" x 9.9" x 1.8"
Weight	➤ 4.1 lbs	➤ 4.4 lbs
Hard Drive	➤ 350MB	➤ 250MB
Memory	➤ 8MB, upgradable to 20MB	➤ 8MB, upgradable to 24MB
Floppy Drive	➤ External 3.5" floppy drive	➤ External 3.5" floppy drive
PCMCIA slots	➤ 2 Type II	➤ 1 Type II
Video	➤ 1MB local bus	➤ 1MB local bus
Screen	➤ 7.8" active color, .25mm dp	➤ 8.4" active color, .27mm dp
Keyboard	➤ 84-key w/embedded numeric keypad & 12-dedicated function keys, inverted "T"	➤ 82-key w/integrated numeric keypad & 12-dedicated function keys, inverted "T"
Pointing device	➤ Integrated TruePoint	➤ Integrated AccuPoint
Ports:		
Serial/Parallel	➤ 1 (16550 UART)/1	➤ 1 (16450 UART)/1
Mouse/Keyboard	➤ 1 for either	➤ Req. port replicator, $239
Floppy drive	➤ 1 integrated	➤ 1 integrated
VGA video	➤ 1 integrated	➤ 1 RGB, req. adapter (included)
Battery	➤ Replaceable, rechargeable NiMH	➤ Replaceable, rechargeable Lithium-Ion
Software	➤ MS-DOS 6.2, WFW 3.11 Lotus Organizer	➤ MS-DOS 6.2, WFW 3.11 CommWorks™ for Windows, MaxTime, Fn-esse™
Extras	➤ Carry case ➤ Extra battery ➤ 24-hour tech support ➤ 30-day money-back guarantee	■ ■ ➤ 24-hour tech support ➤ 30-day money-back guarantee

The ZEOS Meridian 400A is "a threat to Toshiba and its premium Portégé for top rank in the subnotebook market." Threats are idle unless you have the power to back them up. The Meridian 400A is a mighty powerful bundle packed with features at a minimal price. Case closed.

800-554-7172

24 Hours a Day
365 Days a Year

ZEOS INTERNATIONAL, LTD.

Fax Orders: 800-362-1205 or 612-362-1205. Phone Orders: Outside U.S. and Canada: 612-362-1212. Government: 800-245-2449. ZEOS Information Systems, Inc. GSA # GS00K94AGS5176. Purchase Orders, MasterCard, VISA, Am Ex, Discover, Z-Card, COD and affordable leasing programs.

Toshiba Portégé price quoted as of February 23, 1995. Benchmarks test run with PC Bench 9.0. Purchase orders are subject to approval. Business leasing programs available. All prices, specifications and availability are subject to change without notice; call to confirm these and warranty details. Prices do not include shipping. All products and company names are trademarks or registered trademarks of their respective holders. Intel Inside is a trademark of Intel Corporation. ZEOS is a registered trademark, Z-Card is a servicemark; ZEOS Meridian and TruePoint are trademarks of ZEOS International Ltd. (c) 1995 ZEOS International Ltd., 1301 Industrial Blvd., Minneapolis, MN 55413 USA. ZEOS is a publicly traded company (NASDAQ symbol: ZEOS).

DYNPCM-0005A

CIRCLE 125 ON READER SERVICE CARD

John C. Dvorak

Gambling on a PC Near You

There seems to be a worldwide gambling mania taking hold and you can bet that it's headed for your desktop. There is almost nothing to prevent the Internet from becoming a virtual Monte Carlo as gambling interests around the world aim to separate you from your hard-earned money. Expect to be playing a slot machine right on your desktop, with nobody there to stop the action. Only well-informed users can prevent this from happening.

I've been concerned about the gaming mania, new lotteries, and Native American–sponsored casinos. I mean, even when you visit Las Vegas, you have to ask yourself where and when it will end. Somebody is making money and it isn't the gambler.

Then there's on-line gambling. Dozens of companies are working on it. The specter of out-of-control gaming on the Internet has the government regulators spooked. I would suspect that the Nevada gaming commission might be concerned too, since it keeps things honest at gaming tables statewide. Perhaps Nevada offers the last honest bet you'll be able to make. Bookmakers out of Mexico are already taking on-line bets for nearly any horse race run in the U.S. and worldwide. The client sets up an account in Mexico or passes along a credit card number and starts to bet. The taxes that would have normally been collected at racetracks or legal betting parlors in the U.S. for domestic purposes are now lost to Mexico or wherever the gamblers set up shop. The Internet is the network that makes this remote gambling possible.

I've been following this action since the weird arrest of Robert Thomas for having an alleged pornographic bulletin board service (BBS) in California. He was busted in Tennessee because the BBS was accessible over a Tennessee phone line. It didn't make much sense at first because Tennessee has plenty of X-rated BBSs. Jack Rickard, publisher of *Boardwatch Magazine*, which covers the BBS scene, confirmed this and gave me a list of BBSs in Tennessee at least as offensive as Thomas's BBS.

The entire Thomas incident was bizarre. He was first accused of running a child-porn BBS—a charge later dropped. I now assume the initial accusation was to keep the media from following the case, since most shy away from child-porn anything. Once all scrutiny was removed, Thomas could be quickly found guilty in what can best be described as a kangaroo-court scene that would make a good book. To make a long story short, the purpose of this interstate arrest was to set a legal precedent for all interstate activity done over a computer network. Authorities hope the result of this case (along with that of a parallel case against Thomas pending in the Utah courts) will be effective control of interstate banking, interstate sales tax collection for on-line mall activity, and interstate gambling for the purpose of collecting taxes (which authorities would like to ban outright).

Thomas can't figure out what hit him, and virtually nobody has written about or considered the implications of this case or the implications of on-line interstate gaming. Whatever is going on, it will have far-reaching repercussions as the global on-line community gets stifled by the states'-rights movement and local special-interest groups that want to promote their values or their tax-collection ideas. I don't for a minute believe that Thomas was busted for the good of the community. I also don't think that the bureaucrats care an iota about the potential damage that the gambling mania may have on the American culture.

The specter of out-of-control gaming on the Internet has government regulators spooked.

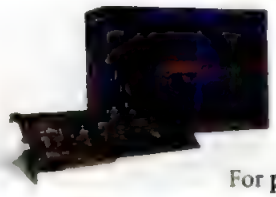
This is a story about tax collection. I'd advise everyone to keep an eye on their money clip. If the gamblers don't get it, the tax man will. I hope we can keep gambling off the Internet and the tax-hungry government out of our collective wallet. I haven't much confidence, though, that either of my desires will be fulfilled.

Illustration by James Steinberg

EXPERIENCE INCREDIBLE SPEED WITH OUR NEW PC GRAPHICS ACCELERATOR CARDS.

Go ahead. Dream. We'll help you make it all come true. All through the blazing speed and outrageous power of our exciting new family of graphics accelerator cards for Windows® and DOS® applications. Each card offers the extreme innovation and know-how of r[PC]—an independent business unit owned by Radius.™ And each lets you do things that are out of this world.

Best of all, for each and every graphics application, you'll find an r[PC] solution that gives you the ride of your life.



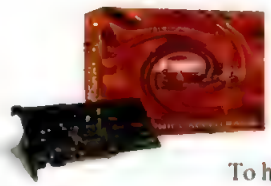
FIRESTORM 192

The professional-strength 192-bit graphics accelerator

COMPARISONS	HIGHEST 24-BIT RESOLUTION	DATA PATH	WINTACH SCORE*
FireStorm192	1600 X 1200	192-BIT	298
Number Nine Imagine 128	1152 X 910	128 BIT	207
ATI Graphics Pro Turbo	800 X 600	64-BIT	152

*Tested in a 90MHz Pentium PCI machine at 800 x 600 x 24-bit

For power-hungry jobs like high-end desktop publishing, prepress and CAD/CAM, look no further than our FireStorm192.™ It takes the strain off your CPU with a 192-bit graphics engine built from three separate, 64-bit GUI processors. Plus, for total color control of your screen, we've included the powerful ColorComposer™ toolset. All of which let you scream along with amazing resolution and a huge color palette.



FIRESTORM 64

The value-leading 64-bit graphics accelerator

COMPARISONS	WINBENCH 4.0 SCORES
FireStorm64	14.2
ATI Graphics XPression	11.3
Number Nine GXE	10.3

*Tested in a 90MHz Pentium PCI machine at 800 x 600 x 24-bit

To help bring business graphics to life, turn to our FireStorm64.™ It gives you rapid refresh rates and high resolutions. That means incredible new results with business and presentation graphics, entry-level desktop publishing and multimedia applications.

So let your imagination soar. Then see how r[PC] takes you up higher and higher to places you never thought possible. Call now for more information 1-800-459-4RPC.

raise the power

r[PC] radius.

© 1995 Radius, Inc. Radius, the r[PC] logo, ColorComposer and all r[PC] product names are trademarks of Radius, Inc. Other brand and product names are trademarks of their respective holders.

CIRCLE 230 ON READER SERVICE CARD

John C. Dvorak

Inside Track

Hard Disk Wars Dept.: If you haven't noticed, the price of a hard disk has fallen drastically. Insiders tell me that the fast gigabyte drive will be selling for $299 by year's end and that the 540 drive will be the one found in those cheap low-end systems. By the end of the year nothing smaller will be in production. Now I suppose you can dub yourself an old-timer if you can recall the Shugart 5MB 5.25-inch hard disk that helped start the hard disk revolution. I remember being shown the disk drive and thinking how impressive its load time was. "Wow! And it holds an entire 5MB too!"

There are at least four major court cases in which on-line services are being sued for allowing a libelous posting to occur. Thus far the courts have sided with the defendants, but this may end when Microsoft enters the arena.

Here's a question for you: **Will Windows 95 kill the Internet?** That's what one industry-newsletter pundit **foolishly** claimed recently. For some odd reason he believes (as do other rubes) that just because Microsoft will have a button on Windows 95 to connect users to Microsoft's on-line service, the 'Net is dead. The Microsoft Network is coming into a market dominated by established companies (AOL, CIS, Prodigy) and a rich newcomer (AT&T), along with the Internet itself and 50,000 BBSes. I mean, let's be realistic. Can you spell *fat chance*?

The **fear** generated by Microsoft is a function of the single fact that Windows 95 will have the interface to The Microsoft Network built-in. One click and you're on-line, assuming you have a modem hooked up properly. The only effect this may have is to introduce people to on-line services and **expand the market** even more. The appeal of the Microsoft service will be limited from **internal fears** that will develop at the company limiting the service to minimal forums excessively **censored.** There are at least **four major court cases** in which **on-line services are being sued** for allowing a libelous posting to occur. Plaintiffs aren't suing the people making the comments, they are suing the services. While thus far the courts have sided with the defendants, saying they can't possibly monitor all the forums for such activity, **this may end when Microsoft enters the arena.** The argument is simple. "You're computer experts, aren't you? Can't you screen for this kind of thing? You are the biggest software company in the world, aren't you? You therefore have the resources to keep this from happening, don't you?"

Another aspect to the on-line world that is important is **on-line socialization,** which can be very risqué and includes the exchange of .GIFs and other photos through on-line services. Many of the photos are **pornographic** to the point of being illegal in many states. Microsoft cannot afford to be associated with, for example, **a pornography ring** that may infiltrate its service and use it as a nexus for exchange. Suddenly Microsoft is embroiled in a criminal action.

Finally, the most overlooked aspect is Microsoft's **pathetic track record** for on-line activity. The company has never been able to make a simple—let alone a complicated—telecommunications product. Years ago, a **miserable program** called Access was introduced (yes, since then the name has been used for the database product), and it was, by far, **worse than the most mediocre of shareware offerings.** Anyone who had the misfortune of being stuck with Microsoft Works for DOS surely remembers that Microsoft took yet **another horrid attempt** at a telecommunications program in that product.

The fact is, like IBM, **Microsoft is insular** and not connected very well to the outside world. This is a technique used to keep its employees in an overworked, self-motivating siege mentality that keeps them focused on executive edict. Changing this would be **anathema.** The company will never understand the true nature of the Internet, BBSes, or on-line services. In fact, the company was even caught off guard by the quasi-on-line application Lotus Notes, and is still trying to figure that out. **This is Microsoft's obvious weakness.** It doesn't have any pieces of the puzzle: neither mail nor encryption nor telecommunications products. Microsoft even got aced recently when America Online bought the browser company that Microsoft was bidding for. **Aced! Not a good sign.**

Miscellaneous Complaints Dept.: This is a bit of advice for people who like to get plugs or mentions in this column or elsewhere. I'm amazed by the phenomenon of companies that use 800 numbers so customers can order a product or service. Although this may have been **a good idea 20 years ago** when toll-free numbers were important, these numbers are of dubious value and are sometimes counterproductive. Because of the international audience in today's society, if I use an 800 number in this column, for example, I get bitter complaints from around the world, since few 800 numbers are internationally accessible. Most companies give out an 800 number with no alternative because of marketing naïveté. **Think about it!** (I was going to close out this column with information on a new product, but the only number the company listed was an 800 number. And the office is closed.) □

How to travel without reservations.

It can happen to any business traveler. You're out on the road and suddenly your laptop has trouble reading your PC Card

It's enough to give anyone reservations about traveling with PCMCIA products

At Simple Technology, we believe there's a better way. That's why we designed our family of PC Cards with true plug n' play features. Plug one card in, replace it with another, then swap them all over again without ever rebooting

Simple Technology PC Card are designed to work in today's popular laptops, including Compaq, Toshiba, IBM and Apple Our cards utilize industry standard Card and Socket Services software to help eliminate system conflicts. So you can spend more time working and less time troubleshooting

As our name implies, we make our PC Cards simple to use Everything you need is included, like software, cables, and easy to read guides. Within minutes of opening the box, you'll be cruising down easy street

So if you've felt stranded in the past with incompatible PC Cards, let Simple Technology point you in a new direction of worry-free mobile computing

For the name of a reseller near you, call **1-800-4-SIMPLE**

Our **Hardrive PC Cards** have enough storage to keep all your spreadsheets letters, databases — even games — at the palm of your hand. So say it into your pocket for the ultimate in convenience and security. Who says you can't take it with you?

Simple
TECHNOLOGY
INCORPORATED
Memory and PCMCIA Solutions™

PLUG 'n' PLAY PC CARDS

Power network. Connect your laptop to today's popular LANs including Novell® and Microsoft® fast high-speed 10 Base-T **Ethernet PC Card** gives your laptop instant access to all the office networked equipment including laser printers and back up devices

yes It runs with NetWare

CDW To order call: 1-800-582-4CDW for your CDW's ad in the back of this magazine.

Simple Technology and the Simple Technology logo are trademarks of Simple Technology, Inc
©1995 Simple Technology. Other brands and names are the property of their respective owners.

CIRCLE 248 ON READER SERVICE CARD

Jim Seymour

The Changing Face of the Interface

There's a big difference between looks and effectiveness. In today's frenzied Interface Wars, that difference is looming large. The whole notion of interfaces—or *surfaces*, to use a term that was popular briefly in the late eighties—is being reexamined now, especially in the wake of Microsoft's splashy preview of Bob, referred to as a "social interface," earlier this year.

Everyone has an opinion about Bob, and not to duck the issue, I do too. I think it's going to be a success for Microsoft, but it won't be particularly successful among the readership of *PC Magazine*. More on that in a minute.

The role of an interface is to give us access to the functions of a program, whether it be an operating system or an application. Good interfaces make access direct and easy to figure out; bad interfaces make access tedious and confusing.

Strong graphics can make the difference, but being pretty or different doesn't necessarily promote intuitiveness or ease of use.

DIFFERENT BUT DATED

The very different Macintosh interface, for example, is sometimes praised as a good graphical user interface, despite its age and general shabbiness. The Mac GUI was impressive a decade ago, but it's grown threadbare through too many cycles of patching and extension—as opposed to, say, improvement and evolution. The Mac interface today looks very much as it did in the mid-eighties, which means it looks passé to many eyes.

The arrival of OS/2 Warp, the pending arrival of Windows 95, and the debut of Bob have not only underscored how grizzled and feeble the Mac interface has become; they have focused a new round of attention on what makes for a good GUI.

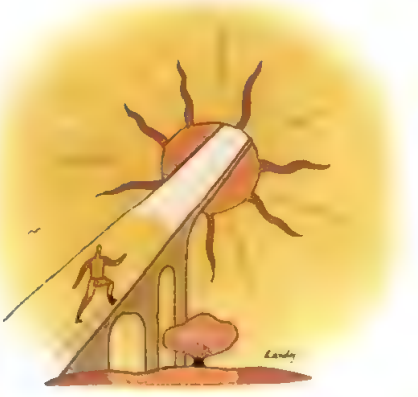
Perhaps more important, new applications have appeared that largely or completely ignore the conventions of the operating-system GUIs lying beneath them. These apps demonstrate that there are many other ways to run software.

Three software packages that illustrate new and different ways of doing things are Kai Krause's Kai's Power Tools (KPT) and the newer KPT Convolver—both from HSC Software—and Kitty Hawk's The Greatest Paper Airplanes (GPA).

Aimed at the high-end graphic-design community, KPT had a great opportunity to demonstrate a truly graphical environment. It didn't disappoint. First on the Mac and now under Windows, KPT and KPT Convolver showed that code can coexist with menu bars and drop-downs without surrendering to them.

PC users seeing KPT for the first time are full of *wows*. As a friend of mine says, "There's a big 'Ahhh! factor' to a program like KPT," simply because it doesn't look like anything we've ever seen before.

Kai's interfaces are not only full of graphical zowies; they also show a good understanding of the dynamics of computer power. For example, images being massaged appear in relatively small viewing windows rather than full-screen; Kai's programs seem to run faster since the screen area they must redraw is smaller.



Good interfaces make access direct and easy to figure out; bad interfaces make access tedious and confusing.

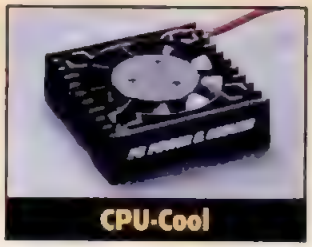
Kai's interfaces aren't hard to figure out, though how to make the most of them sometimes is. But as much as I like working with them and as important as they are to our evolving understanding of GUIs, it's sometimes a relief to return to a more conventional Windows interface after a session in KPT. Because for all their GUI spareness, the interfaces of Windows and applications that look like Windows are familiar—no sunglasses needed.

The Greatest Paper Airplanes' GUI is vastly more

Illustration by Philippe Lardy

BEWARE OF THOSE WEARING BEARINGS!

Our CPU coolers last 10X longer than cheap imitations!



- Thick, kludgy design (.8")
- Ordinary extruded heat sink
- Sleeve-bearing fan (5,000 hrs.)
- Made in Taiwan

- Thin, integrated design (.5")
- Patented die-cast heat sink
- Ball-bearing fan (50,000 hrs.)
- Made in USA (5-year warranty)

When you consider the likelihood of premature failure, cheap CPU coolers are no bargain. As their thin-film fan-bearing lubricant dries up, you're left with an irritating noise, higher CPU temperature, and the cost and hassle of replacement.
So, protect your 486 and Pentium processors the right way!
Use only genuine **CPU-Cool™** coolers.

CPU-Cool 1.9" (486s & 90/100 Pentiums) **$24**
CPU-Cool 2.3" (60/66 Pentiums) **$29**

PC POWER & COOLING, INC.
5995 Avenida Encinas, Carlsbad, CA 92008, (619) 931-5700, (800) 722-6555, Fax (619) 931-6988
We accept Visa, MC, COD, or PO on approved credit. CPU-Cool is a trademark of PC Power & Cooling, Inc. Pentium is a trademark of Intel Corp.

CIRCLE 080 ON READER SERVICE CARD

"Surely...we have a better option than these!"

Yes, you do.

Turn your **excess inventory** into a tax break and help send needy **kids to college.**

Call for your **free guide** to learn how donating your slow moving inventory can mean a generous **TAX WRITE OFF** for your company.

Call (708) 690-0010

EAL

P. O. Box 3021
Glen Ellyn,IL 60138
Fax (708) 690-0565

Excess inventory today....student opportunity tomorrow

Jim Seymour

bare-bones than KPT's interface but still very effective. A notebook metaphor (in a mediocre implementation that results in overly long screen redraws) presents a workbook of paper-airplane designs. Choose a category of planes and then choose the one you want to make. Print the sheet and you get to the glory of the program: an animated sequence that folds the sheet, step by step.

You can rock back and forth, as with a VCR control, to see steps over and over again. You can even set the program to play nonstop through the whole sequence of folds for a particular design.

GPA's interface is plain—even ugly—but it's highly effective: You can easily choose, print, and fold your plane as the interface walks you through these steps. Regular users of Kai's programs would blanch at GPA's bare, primitive screen, but they'd be able to create spiffy-looking pieces of flying origami quickly and easily. Kai's interfaces look worlds better but take some learning; GPA's interface will win no design awards, but it is as intuitive as any I've seen.

HI, BOB

Back to Bob. I was one of the early Bob beta testers, and I worked intermittently with the program over a long period. I grew to dislike its flat and unattractive room designs and odd mix of the mundane (applications boxes and titles) and the wanna-be slick (forced-perspective renderings of rooms that too often looked like old *Little Orphan Annie* cartoon panels).

Most important, I don't think the look of Bob is going to help many people use a computer. But there's more than just the visual at work here: You choose from among a menagerie of little agents and tutors—some with attitude with a capital *A*—who walk you through computer work. My guess is that these little characters are going to be a lot more appealing to new PC users than Bob's comic-book rooms will be. Indeed, I think Bob will succeed in spite of— not because of—its look.

Being beautiful helps but isn't enough; being different isn't necessarily a help at all. A new definition of interface design that's more exact than simply *graphical* is needed—one that specifies interfaces that actively help us use their underlying programs.

Therein lies the real future of PC interfaces. □

Bill Howard

Grab These Bags

What's ideal in a laptop bag is in the eye of the beholder, but most would agree that rugged construction, protection, and an intelligent layout of compartments are key. Last issue, I told you what I'd like to see in a perfect laptop bag. Here are my personal favorites from among the two dozen bags I've been carrying daily over the past several months. Except where noted, these bags are what I'd call medium size, about 16 by 12 inches, and made of nylon. If you want leather, expect to pay $100 to $150 more.

•**Best large bag:** The Tumi 85 Laptop Computer Brief (about 18 by 13 by 7 inches). Tumi luggage is breathtaking in most every respect: fit and finish, durability, and price, particularly if you buy in leather. On the other hand, you get what you pay for. PC Labs technical director Nick Stam has been carrying one daily for more than two years, and it looks almost new. I have three minor gripes: The front organizer pockets are unorganized and there aren't enough subpockets, there's no key ring inside, and there's no umbrella strap outside. If you're buying only one bag, the Tumi (in ballistic nylon) is nevertheless the one to get; it might very well outlast three cheap bags ($295; 800-299-8864).

•**Best medium-size bag:** The Tumi 88 Organizer Notebook Brief (about 17 by 12 by 5 inches). At $225, it holds less, but it's much better organized than its big brother. Also good are the Hartmann Modern EC503 ($225; 615-444-5000) and the slightly smaller EC502 ($215), as well as the Boyt LG318 Computer Brief ($235; 515-648-4626).

•**Best sub-$100 bags (selling price):** The Eddie Bauer Legal-Size Laptop Briefcase ($90; 800-426-8020) and the L.L. Bean Laptop Computer Briefcase by Eagle Creek ($95; 800-221-4221). Both are medium-size bags with lots of pockets.

The snap hook on the less padded L. L. Bean Sportsman's Briefcase ($79) failed the first day, sending my $4,000 notebook tumbling down to the asphalt (no damage, fortunately). The Lands' End Computer Attaché is huge (18 by 15 inches), stiff, and completely unpadded, but it's well made and costs only $65 (800-356-4444).

•**Most protective bag:** The Port Sport Classic (the bag that's sold with IBM ThinkPads). If you've ever lost a laptop to a fall, you'll want a Port bag, which suspends your notebook computer in a U-shaped neoprene sling. Drawbacks: The sling takes up space and the shoulder-strap adjuster can slip as you walk ($159; 203-852-1102).

•**Best framed bag:** The large-size Samsonite Guardian Overnite Computer Case. It feels more like a 6-pound, soft-sided suitcase than a pliable shoulder bag, but it has room for a laptop, a daily planner, a small printer, and a change of clothes, as well as accordion pleats to swallow two dozen file folders ($130; 303-373-2000).

Over the past two years, my two large CL-90 Premier Leather bags from sales-leader Targus have suffered two heart-wrenching snap-hook strap failures, two pocket-clasp failures, and premature wear. But every time I sent a bag back (anonymously), Targus dutifully sent a replacement. Leather Targus bags sell on the street for about half the cost ($150) of a nylon Tumi bag (714-523-5429).

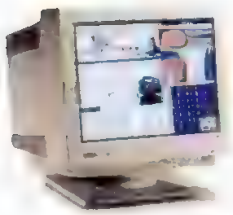
The Compucase C-1 Executive by Heritage Industries claims to be a Targus Premier replica, and it is: It too suffered a snap-hook failure ($150 in leather; 210-377-2434). The Notebook Traveler Leather Carrier from Kensington is above average ($266; 415-572-2700).

A good laptop bag must be rugged, protective, and strong—that includes the strap.

Domke bags, now manufactured by a different company, still carry the name of famed photo-bag creator, Jim Domke. Unlike the original Domke bag, the heavy-canvas Domke F-802 Reporter's Satchel ($90) and F-805 Courier Satchel ($160) aren't very well thought out. For instance, the shoulder strap is apparently meant only for 6-footers. A laptop-specific bag is due (716-328-7800). □

Illustration by Tom Garrett

Now Everyone Can Have The Superior Monitor.



If you've always wanted a top performing monitor, now is the time.

For the first time, you can take a premium 17" Nanao monitor back to your office for less than $1,000. Which is why hard working graphics pros around the world are picking up our new T2·17TS and F2·17EX monitors in record numbers. Sure, the price is terrific. But these users are drawn by Nanao's reputation for quality plus a stunning new array of advanced technical features that are ideally suited for the graphics environment. Nanao even offers a choice of 17" models to satisfy your individual preference. Our FlexScan T2·17TS has an advanced Aperture Grill tube, while the F2·17EX features a flat-screen Invar Shadow Mask tube. Both monitors provide the power you really need to achieve true-to-life colors, crisp typography and a stable screen image. Ultra high 1280 x 1024 resolution at 82Hz refresh rate, Colorific™ color management software and on-screen image controls deliver a new level of graphics performance. For added safety against radiation emissions, TCO compliance is now available as a standard feature.

If you've been looking for a superior 17" monitor at an equally great price, your search is over. The T2·17TS and F2·17EX are available – and affordable – from Nanao.

F2·17EX	
Dot Pitch	0.26mm
Scan Freq.	H:30-86kHz, V:55-160kHz
Rec. Resol.	1280 x 1024 @ up to 82Hz
Max Resol.	1600 x 1200 @ up to 66Hz
On Screen Control	ScreenManager™ and ScreenManager™ Pro
Standards	MPR-II, TCO

T2·17TS	
Aperture Grill	0.25mm
Scan Freq.	H:30-86Hz, V:55-160Hz
Rec. Resol.	1280 x 1024 @ up to 82Hz
Max Resol.	1600 x 1200 @ up to 66Hz
On Screen Control	ScreenManager™ and ScreenManager™ Pro
Standards	MPR-II, TCO

See us at Spring COMDEX Booth M7139

*3-year warranty**

Colorific

KODAK

CALL OUR FLEXFAX FAX BACK NUMBER 1-800-416-FLEX

NANAO

Superior In Every Detail

NANAO USA CORPORATION
23535 Telo Avenue, Torrance, CA 90505
(310) 325-5202 Fax: (310) 530-1679
1-800-800-5202

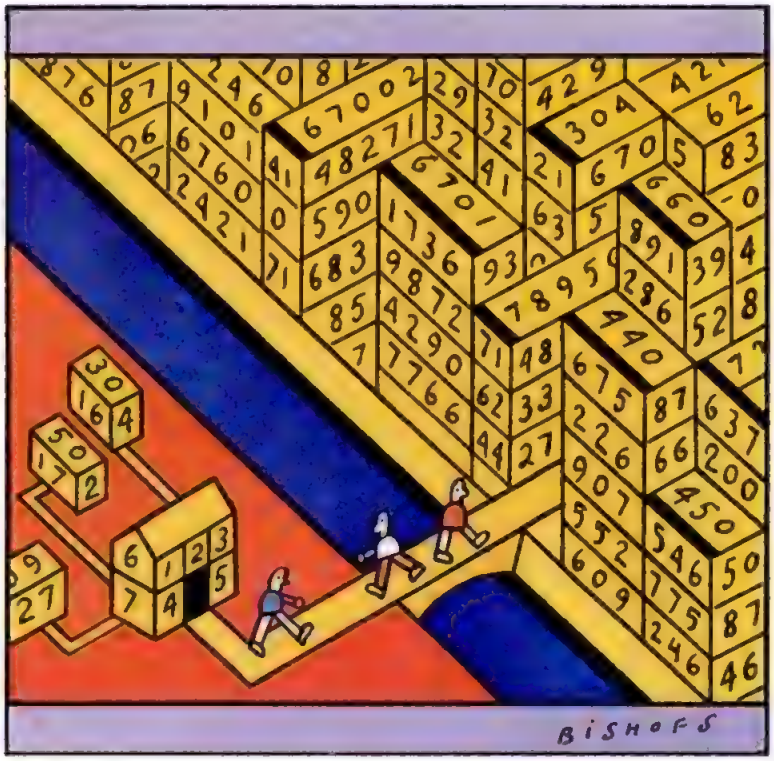
*3 year on P & L and CRT. Superior In Every Detail is a registered trademark of Nanao Corporation. All product names are trademarks of their respective companies. ©1995 Nanao USA Corporation.

NETWORK EDITION

COVER STORY

INTERNET SERVERS

Publish or Perish??



The time is ripe to make your company's products and services known on the Net.

By O. Ryan Tabibian

Succeeding in today's business world requires not only marketing and financial savvy, but also the will to use technology to broaden your potential market reach. In addition to joining a commercial on-line service, for example, even the smallest business can benefit from having a presence on the Internet—not just access to it, but a presence.

Illustration by Maris Bishofs

PC MAGAZINE

Who and where is your next customer? It could be someone out there on the Internet. Do you want to let your competitors make the first investments to find out—while you sit back and see what happens? If not, take a look at our cover story about Internet servers here in Network Edition.

Here, *PC Magazine* senior technical analyst Ryan Tabibian looks at the nuts and bolts of four hardware/software solutions, collectively called Internet servers. These are intended as plug-and-play systems that sit on your LAN and provide Internet services.

But are they really plug-and-play? These *are* Unix systems, for the most part, after all. Some include Web authoring software, to turn your company into a Web site. We even put together our own home-brewed Internet servers and give you guidelines for putting one together yourself.

YOU SHOULD ALSO CHECK OUT our related coverage further on in this issue. Several product groups are emerging as the Internet becomes more important to business. Start on page 195 with an overview called "The Internet Means Business." Our software team reviews several Web authoring packages, explains about setting up FTP, Gopher, and WAIS sites, and gives you recommendations on how to use Internet e-mail to greater advantage.

ON THE FAST ETHERNET FRONT, things continue to roll. We've got a Network Edition First Looks review of 3Com's first 10/100 PCI Fast Ethernet board. See how easily it configured and how it performed against the Editors' Choice from our recent roundup ("New Reasons to Go Fast Ethernet," Network Edition, April 11, 1995).

—Gail Shaffer

Upgrade today to the only network operating system better than NetWare 3: NetWare 4.1.

The network. Your business depends on it. You keep it running. It's your baby. Well, what you're about to read will redefine networking. You'll see how the services in NetWare 4.1 define what a next generation network should be, and why it's so important that you upgrade today. The facts are right here in black and white. Please take ten minutes to read this ad. After all, isn't your business worth ten minutes of your time?

NetWare Directory Services. Access and view your entire network at a single glance.

The previous generation of networks only let you view the network one server at a time. They weren't exactly convenient. But with NetWare 4.1, it's different. You get a complete view of the network. It's the only network that allows users to login once and access any file, document or resource for which they're authorized. Even better, administrators can manage the network from a single-point-of-administration. That means you avoid the hassle of managing your network server by server, managing it instead as a single entity.

Conveniences like these can save you a whole lot of time and money.

NetWare Messaging Services. The simplest way to manage your E:mail users.

In the past, messaging required a separate purchase, a separate installation, and a separate database. With NetWare 4.1, everything is a lot simpler. That's because integrated messaging built into NetWare 4.1 works with almost any E:mail front-end application. There's no additional mail software needed. And, it's integrated with NetWare Directory Services, so network and E:mail administration can be accomplished through a single-point-of-administration. It's a lot simpler, and a lot easier.

NetWare Multiprotocol Routing. Get your data from point A to point B.

Getting connected to other networks usually means buying separate hardware. But with NetWare 4.1, multiprotocol routing comes built-in. And because NetWare's Multiprotocol Routing supports IPX, TCP/IP, Appletalk and others, it connects networks without the need for additional hardware. And not buying all that extra hardware can add up to big savings. And who could possibly be against big savings?

NetWare Network Management. Easily the most manageable network.

NetWare 4.1 offers unmatched management and administration

capabilities. For example, it allows you to take full control of any server from anywhere on the network. It also has a new graphical user interface that lets you manage the network as a single entity, instead of a collection of separate servers. So jobs that used to take hours can be accomplished in minutes. Plus, tasks like setting up users, granting security privileges and access to resources—tasks that were very time consuming with NetWare 3—aren't with NetWare 4.1. Click a few icons, then type information in a dialog box. You've just added another user to the entire network. It's quick and easy. Again—saving you time and money.

NetWare 4.1 Security Services. Simply the industry's most secure NOS.

One of the greatest concerns about any network operating system is how secure it is. NetWare 4.1 includes RSA security, the industry's most secure password encryption and digital packet signature technology. In fact, it was designed to meet the National Computer Security Center's Class C2 Network Security criteria. Look. If you can't afford to have confidential data in the wrong hands, that's reason enough to upgrade to NetWare 4.1 today.

NetWare 4.1 File Services. We just improved on perfection.

NetWare 4.1 shares the same industry leading file system as NetWare 3, except it also comes with terrific, industry leading enhancements. There's a server-based file compression feature that can double the size of the hard drive, leaving more room for data. And sub-allocation provides more efficient storage. It also provides optional large block sizes which speeds data transfer performance from hard drive to memory. And data migration reduces storage media costs by transparently migrating data to near-line or off-line storage. You know, this is a great way to avoid having to shell out the big bucks for more space later.

NetWare 4.1 Print Services just got smarter.

With NetWare 4.1, you can say goodbye to printing nightmares for good. NetWare 4.1 provides the most robust set of print services in the industry. It's terrific. For example, you don't need to know anything about the print server. All you need to know is the name of the printer and you're set. That's it. Plus, NetWare 4.1 Print Services maximize your hardware investment because it allows up to 256 printers to run off one server (as opposed to NetWare 3, which limits you to 16 printers). Just think how much time, money, and hours of frustration this could save you.

7 Key Services	NetWare 4.1	NetWare 3
1 DIRECTORY Global directory service	YES	NO
2 INTEGRATED MESSAGING	YES	NO
3 MULTIPROTOCOL ROUTING	YES	Add-on product
4 NETWORK MANAGEMENT Graphical user tools provide view of entire network	YES	NO
5 NETWORK SECURITY		
RSA public/private key	YES	NO
Restrict login to specific Mac address	YES	NO
Security auditing	YES	NO
6 FILE SYSTEM AND STORAGE Support for data-migration hardware, data compression and disk block suballocation	YES	NO
7 NETWORK PRINTING	256 per print server	16 per print server
Additional Services		
• INTEGRATED SYSTEM FAULT TOLERANCE LEVEL III	YES*	Add-on product
• CLIENT SUPPORT AND INTEROPERABILITY		
NetWare for Macintosh, Number of user licenses included	Included in Netware user licenses	5
Graphical user tools	YES	NO
• WAN SUPPORT Network link Service Protocol™ (NLSP)™	YES	Add-on product
• ARCHITECTURE		
Maximum number of user connections per server	1,000	250
Nondedicated server	YES**	NO
Single login to network	YES	NO
Additive licensing	YES	NO

NetWare Return on Investment. It makes sense on your bottom line.

NetWare 4.1 has the lowest cost of ownership in the industry. In fact, the META Group reports NetWare 4.1 can cut 25%† from the cost of managing a network. Think of it. That means your NetWare 4.1 upgrade or new purchase will virtually pay for itself in no time. Here's a chance to make the accountants smile for once.

NetWare 4.1. All this and much, much more.

NetWare 4.1 also comes with everything you need to run your network on TCP/IP, so you can run IPX or TCP/IP throughout your network. It also has built-in support for your Macintosh users. And built-in System Fault Tolerance level III capabilities. (To activate this service, all you have to do is simply purchase a license disk and you can reduce the chances of network failure to almost zero. And because it's built-in, there's no need to reload your system).

Still, we know all these features wouldn't mean diddly if they didn't work right out of the box. So we submitted NetWare 4.1 to rigorous testing—first we tested it at Novell labs, then the press took a crack at it, and finally, our toughest customers got their chance. It passed with flying colors. Without a doubt, NetWare 4.1 is set to take center stage in the industry.

We hope we've told you enough to get things underway. But in case you need more information about NetWare 4.1, just call Novell at 1-800-844-6661 or dial us in at http//www.netware.com. We'll do everything we can to help.

NOVELL

NetWare 4.1

The only network ready for tomorrow, today.

©1994 Novell, Inc. All Rights Reserved. Novell and NetWare are registered trademarks of Novell, Inc. † Source: META Group. *With purchase of license disk. **NetWare for OS/2 option

But how do you get there? One way is to establish an Internet server on your network that offers a variety of Internet services. The early crop of Internet servers we review here—the BBN Internet Server; The Neticity Workstation, from IT Solutions; the WebForce, from Silicon Graphics Inc. (SGI); and the Netra i5 Internet Server, from Sun Microsystems Computer Co.—even go some distance to make the process painless. This marketing investment will cost you around $8,000 to $9,000.

These servers accomplish two specific tasks. First, they let you publish (that is, post publicly) and serve documents on the Internet for all of its users to access. Much of this is done on the Internet's World-Wide Web. Second, they provide the tools necessary to localize many Internet resources, such as e-mail, Network News Transfer Protocol (News, or NNTP), and Domain Name Service (DNS), that you normally would access over slow WAN links.

Getting onto the Net no longer requires learning archaic Unix commands or hiring consultants. Each of these servers is a bundled hardware/software solution. Each runs on some flavor of Unix (the standard-bearer OS of the Internet), but each also offers management tools that hide the complexities of Unix.

You can actually publish information about your company and its products and services. The Internet lets large and small businesses go global and tap into a potential customer base of 20 million users.

TWO KINDS OF SERVER

The four servers in this roundup represent two kinds of Internet server. The BBN Internet Server and the Netra are bundled solutions that offer multiple services, such as e-mail, DNS, a Hypertext Transfer Protocol (HTTP) server, and News. The Neticity and WebForce are designed for a more focused solution: publishing and serving using the Hypertext Markup Language (HTML). Each combines an HTTP server with intuitive authoring tools that require no HTML coding and make creating Web home pages a breeze. To gain perspective, we also built our own plug-and-play Internet servers on standard PCs, one running NeXTStep 3.3 and one running Microsoft Windows NT 3.5 (see the sidebar "*PC Magazine*'s Home-Brewed Internet Servers").

You should note, too, that these servers are not designed to deliver complete access to the Internet. In fact you don't even need them if you are looking just to provide Internet access to only a few users in your organization. For that you need other tools, such as TCP/IP clients from NetManage or SPRY (among others), a connection to the Internet through an Internet Service Provider (ISP) such as Exodus (formerly NetUSA) or AlterNet, and a set of IP addresses, which can often be provided by your ISP (see "Making the Internet Connection," October 11, 1994).

To test the products we installed them in a multiplatform, multiprotocol environment that consisted of HP Unix Workstations; Novell UnixWare, and NetWare file servers; and of course, Microsoft Windows, Microsoft Windows NT, and Macintosh clients. The network was connected to our local Internet provider, Exodus, through an Ascend ISDN router. We tested each product for the quality and functionality of the tools, ease of use, and management features.

We found the BBN Server to be the best all-around package: It included all the popular services such as DNS, e-mail, HTTP,and News in a single box. BBN's Mac-based management tool was a plus. The Netra offers many popular Internet services, but the bundle is not as complete as BBN's, lacking HTTP and News . Many such tools are available free on the Internet, but why not just include them? The Netra also offers a menu-driven management tool that simplifies setting up services.

The Neticity and WebForce are both complete Web platforms. The Neticity comes preloaded with the NCSA HTTP server and an impressive object-based HTML authoring tool from Pages Software that helps create and publish HTML documents in a snap, making it the better authoring system of the two. The WebForce bundles the Netsite Communications Server with a good authoring tool, and it is the superior server.

WHAT YOUR SERVER LOOKS LIKE

Each of the servers in our roundup offered a mix of features and functionality that could fit any type of environment. Your choice will depend on the types of services you need, the OS and hardware platform you prefer, bandwidth needs, and security requirements.

First, what services do you need? Normally services such as DNS, e-mail, and News are run locally for better performance. While setting up e-mail is rather painless on both the BBN Server and the Netra, installing DNS and News can be

Emerging Product Class

Although we prefer to designate an Editors' Choice in every comparative review we do, we always do so choosing from a pool of comparable products. In this emerging product class called Internet servers, our criteria actually pulled together four new products that are different enough that we decided it was better to make recommendations to you about each. (New product categories are like this.) The four actually do break out into two groups of two like products each. So you should compare the like products head-to-head.

Businesses mainly looking to pick up a set of general Internet services can look to either the BBN Internet Server (which seemed the best in a general way) or the Netra i5 Internet Server, from Sun Microsystems Computer Co., and be happy with either. There are a few trade-offs. The BBN Server offers a reasonably easy installation on a Unix platform—and the Microsoft Windows interface is due out by the time you read this. The Netra, however, is situated on a higher-performance platform and is a most encouraging attempt at a true plug-and-play server.

If you've decided you want HTML-Web-page authoring tools up front, either Silicon Graphics' WebForce or IT Solutions' Neticity Workstation will deliver. The WebForce shows its graphical heritage in its excellent authoring capabilities. Installation, however, was a bit rough. The Neticity, on the other hand, takes full advantage of the NeXTStep OS to offer ease of use and strong features, combined with good authoring tools. NeXTStep also clearly made a difference in ease of installation and configuration.

SMC introduces Fast Ethernet 10/100 Mbps.

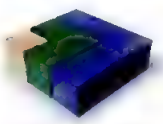
10 times faster.

You know Ethernet is reaching its limits. You know Fast Ethernet could be the answer. But you aren't ready to implement Fast Ethernet in a significant way.

Now here comes a boatload of new users with shiny new EISA and PCI machines—and they're all asking for network connections.

So what, exactly, are you supposed to do?

Keep your options open. With Ether 10/100 and EtherPower 10/100 Mbps, the EISA and PCI Fast Ethernet cards from SMC.



SMC NEXT

LAN Access
Bandwidth Acceleration
Intranetworking

Both cards are built to run at 10 Mbps in your Ethernet environment today, and can switch to 100 Mbps Fast Ethernet mode with a simple software command.

No extra charge.

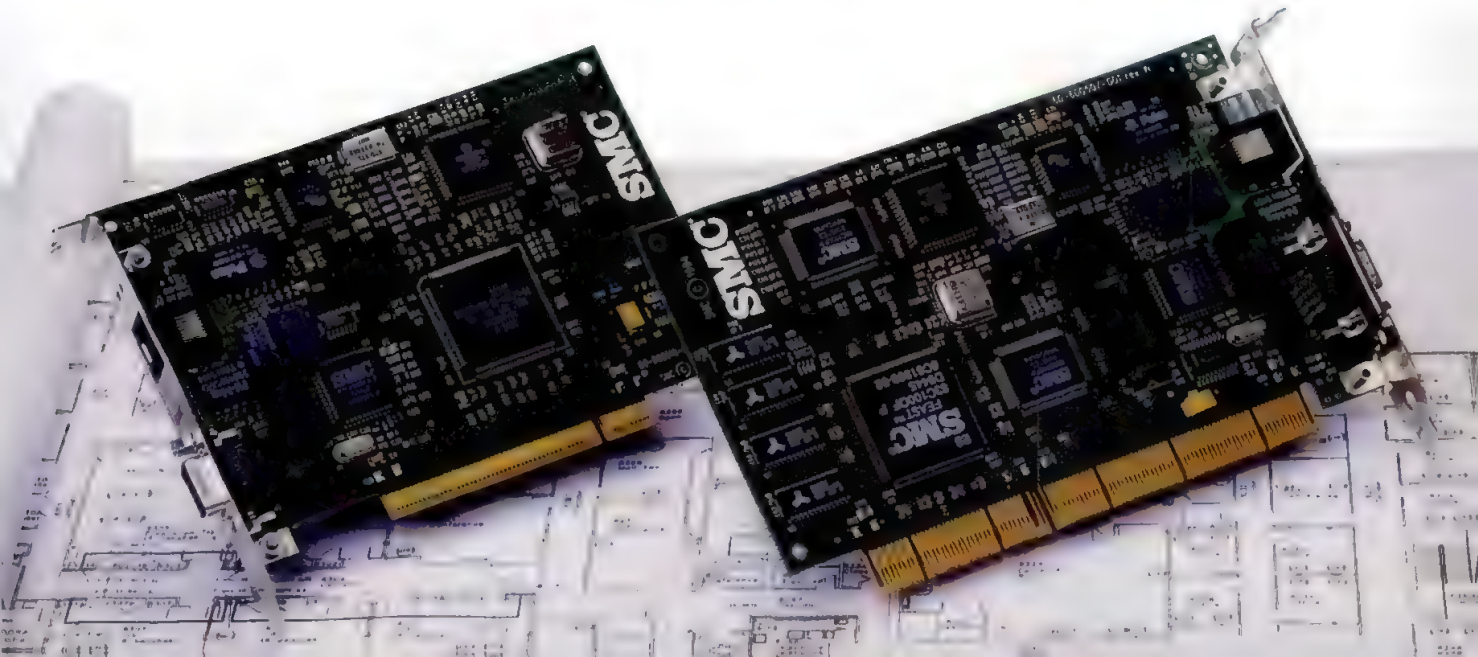
Best of all, with SMC you get the extra speed of Fast Ethernet—at little or no extra cost. Plus, all the extras that have made SMC one of the best-known names in networking—and the leader in the PCI marketplace today. A complete set of Ethernet and Fast Ethernet drivers. Backward compatibility with our PCI 10 Mbps cards. 100% compliance with IEEE 802.3, 100BASE-TX, and 10BASE-T standards. An RJ-45 connector for UTP cable—plus a DB-9 for STP, so Token Ring customers can upgrade to Fast Ethernet. And a lifetime warranty.

To future-proof your network, call 1-800-SMC-4YOU, Dept. FF31, and ask for our free Fast Ethernet tutorial and a copy of our "Networks in Transition" video.

SMC®

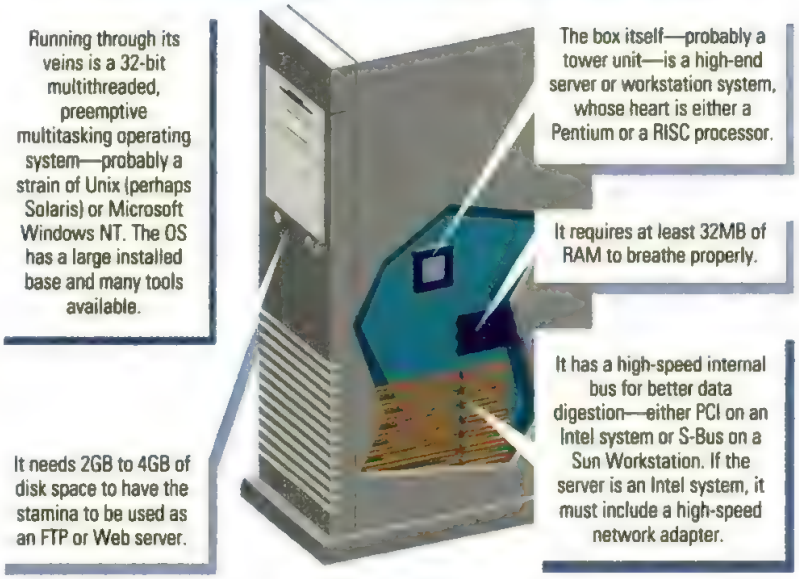
All trademarks and registered trademarks are the properties of their respective holders. © Copyright 1995 Standard Microsystems Corporation

CIRCLE 909 ON READER SERVICE CARD



ANATOMY OF AN INTERNET SERVER

Here's a look at the physiology of a server that can put your business on the Internet.



complicated. News, for example, requires gigabytes of disk space and a lot of manual configuration to various Unix files. Your best option for DNS is to create a caching DNS server, which learns the network routes from a primary server located with the ISP.

If your focus is setting up a Web server to publish documents, either the Neticity or the WebForce can make it a straightforward process. Both offer unbeatable intuitive HTML authoring tools on strong server systems. One difference is the hardware platform. The Neticity depends on a 486 PC, with its inherent limitations—slow bus speed and overall poor network performance compared with the WebForce.

If you're expecting a lot of hits on your Web server, you should consider the WebForce. For smaller sites, any of the products should be suitable. (You can also run the HTTP server on the BBN Server or the Netra, but neither offers the complete plug-and-play Web solution that the Neticity or Netra do.)

For your operating system, there's little choice in 32-bit OSs right now—beyond what flavor of Unix you prefer. Products will start to come on the market supporting Windows NT as well. But it will take time before the number of tools for Windows NT match the number for Unix.

The hardware platform should be robust, with a fast CPU, plenty of RAM, ample disk storage, and a high-speed bus. An Internet server that offers a lot of content that includes graphics and sound, for example, should have at least 32MB of RAM, and will be best served by a platform, such as one of SGI's Indys or Sun's SPARCstations, which have a high-speed bus and plenty of processing power. Most PCs, even those with PCI buses, do not match the performance capabilities of the Sun or SGI boxes, especially under heavy I/O use.

For bandwidth needs, the two most popular methods are through a dial-up Point-to-Point Protocol (PPP) or a leased line. If you are planning an e-mail–only gateway, a PPP line should suffice. But for providing content through a Web Server, a 56K or better leased line is your only option.

Security is last on our list, but it should be far from least on your agenda. By connecting to the Internet, you expose yourself and your company to the hackers that run wild all over the Net. Thus, a decision on a security policy should be a priority. (See our sidebar "Security Alert.")

The potential importance of the Internet to your business is clear. With some planning and implementation you can be up and running in a matter of days. So what are you waiting for? It's only your bottom line.

BBN Internet Services Corp.

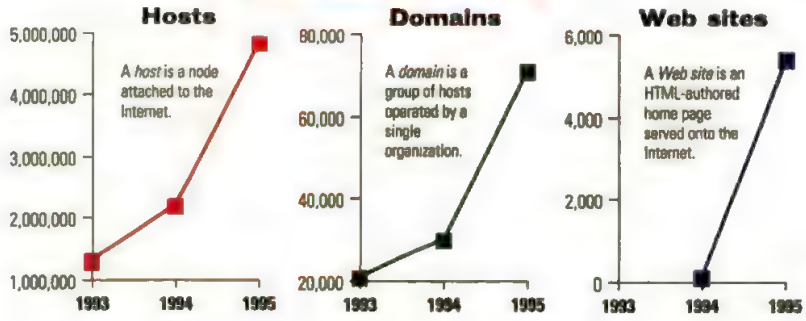
BBN Internet Server

This veteran Internet provider's foray into the bundled Internet server market is impressive. For years BBN Internet Services Corp. has been one of the largest Internet access providers. All that experience clearly is reflected in this server. It's a good choice for small to medium-size businesses.

The BBN Internet Server is a complete Pentium-based, plug-and-play Internet server that gathers a number of shareware software pieces, such as DNS, e-mail, HTTP, and News into an easy-to-use box. Although the $9,850 price may seem steep, BBN bundles a shareware OS along with a bunch of tools (which are admittedly available free on the Internet). BBN also provides good management, integration, and ease of use.

Two steps are offered for managing the server. First, you can have BBN manage it remotely for the first year for the mandatory $1,500 fee. The fee includes some initial configuration, such as creating users and configuring the network information. And you can do some of the management through an intuitive Mac-based utility called Frontdoor (a Windows version should be available by the time you read this). Frontdoor lets you add and delete users or local newsgroups and manage the Gopher and Web servers.

INTERNET GROWTH

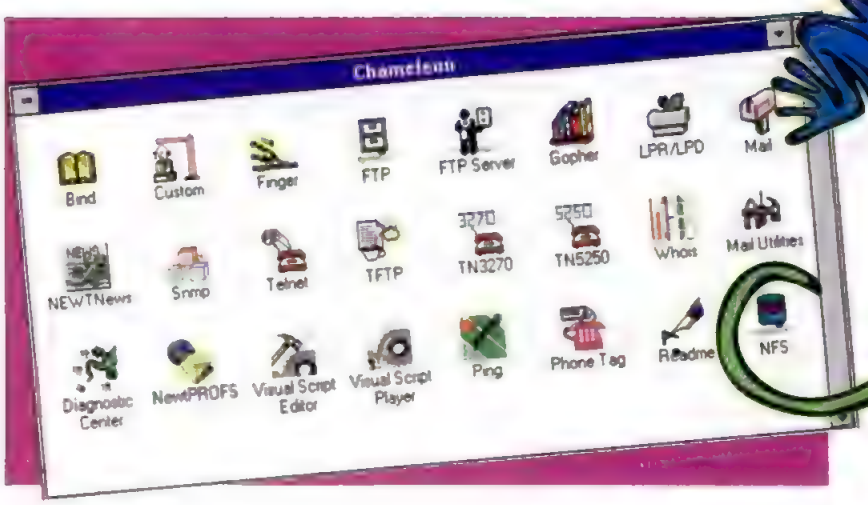


TCP/IP Applications For Windows.

MICROSOFT® WINDOWS™ COMPATIBLE

yes NetWare Tested and Approved

Network Your PC To The World With Chameleon.



APPLICATIONS INCLUDED:

Terminal Emulation
- Telnet: VT100, VT200, TVI, TN3270, TN5250
- Visual Script Editor & Player

File Transfer
- FTP Client & Server
- TFTP

File & Printer Sharing
- NFS Client & Server
- LPR/LPD

Electronic Mail
- SMTP Mail with MIME
- Phone Tag
- IBM PROFS
- POP2, POP3, SMTP

Internet Access
- Gopher
- Newsreader
- Whois

Network Utilities
- Ping
- Finger
- Diagnostic Center/Trace Agent
- DNS Client & Server

WinSock TCP/IP
- 100% DLL TCP/IP Stack
- Windows install and setup
- LAN: Ethernet, Token Ring
- Dialup: SLIP, CSLIP, PPP & ISDN

BEST VALUE.

Chameleon is a TCP/IP Windows software suite that offers more applications than any other product. It provides you with a comprehensive Windows solution for TCP/IP networking.

SEVEN INTEGRATED SOLUTION SUITES.

Chameleon includes seven integrated solution suites: terminal emulation, e-mail, file and printer sharing, remote access, network utilities, administration tools, and an easy point-and-click interface into the Internet.

SEAMLESS ACCESS TO OTHER HOST SYSTEMS.

Chameleon includes more applications that allow you to access information on Unix, mainframes, minicomputers, PC-based LANs and WANs, and the Internet.

OFFICE, HOME, AND REMOTE NETWORK ACCESS.

Connect to your network and the Internet via LAN or dialup access with one easy-to-use software package. Send and retrieve email, download files, print documents, login to remote hosts, and run client/server applications. Connect your PC to the world with Chameleon.

NetManage Chameleon includes WinSock TCP/IP and is 100% DLL. Chameleon requires only 6KB memory and installs in just 5 minutes.

Sept.1994 Sept.1994 Sept.1994

NETMANAGE™

(408) 973-7171

e-mail: sales@netmanage.com

World Wide Web: www.netmanage.com

© 1995 NetManage Inc., 10725 North De Anza Boulevard, Cupertino, California 95014, U.S.A. Fax (408) 257-6405
Specifications are subject to change without notice. All trademarks are property of their respective companies.

CIRCLE 877 ON READER SERVICE CARD

PC Magazine's Home-Brewed Internet Servers

With the popularity of the Internet, it was bound to happen. Where vendors used to add a sound card to a PC and call it a *Multimedia PC,* today some add several integrated IP-based tools to a system and call it an *Internet Server.* The Internet has been providing many such tools—for free—for over 20 years.

At PC Magazine Labs, West Coast, we sniffed a challenge. So we set about to create our own Internet servers using tools available on the Net. With some patience and, admittedly, some Unix savvy, you too can create your own solution and save about $3,000 in the process.

For the OS, we chose NeXTStep 3.3 for one server and Microsoft Windows NT 3.5 for another. NeXTStep is perhaps the most robust and intuitive Unix on the Intel platform. Windows NT offers many of Unix's architectural benefits. For services, we determined that an Internet server should offer DNS, e-mail, FTP, Gopher, HTTP, and News.

We began our search for services by posting anonymous messages to some NeXTStep-related newsgroups on the Internet. It also turns out that a few of the tools, such as DNS, e-mail, FTP, and telnet, are already built into NeXTStep. For Windows NT, some of the tools are available in the Windows NT 3.5 Resource Kit or through the Microsoft FTP site. We also used an impressive book called *Marketing Internet Information Services* (O'Reilly & Associates, 1994), which provides step-by-step instructions on setting up the services on any Unix system.

We had a tremendous response from the NeXTStep user community. Many messages suggested applications and told us where we could find them. From there, we downloaded the appropriate files and started brewing. Enabling required little Unix knowledge, thanks to NeXTStep's intuitive management tools.

On the other hand, installing and configuring other services required a bit of Unix know-how: We were able to find source code for a only couple. We had to compile the applications to run on NeXTStep. In the Unix world, compiling means that you have to run a Make file, which requires a C compiler to compile your source code. But NeXTStep 3.3 doesn't include a C compiler, so we had to install the NeXTStep Developer 3.2 to get one.

After some trial and error, we successfully compiled a Gopher and News server for our NeXTStep system. In addition we downloaded a precompiled binary file of the HTTP server from the CERN Web site.

Once all the tools were in place and successfully installed, the configuration of each service can be a straightforward process—if you are familiar with Unix configuration files. Although we found some comprehensive instruction files with each service, figuring out how to publish information was rather complicated. We spent several hours shuffling through documentation and did some experimentation, but we eventually ended up with a complete Internet server.

WINDOWS NT COMES TO PLAY ON THE NET

For a while, Windows NT will have some limitations in both the number and availability of services. Unlike Unix-based OSs, Windows NT does not support any Internet services out of the box (except FTP). But early versions of the DNS, Gopher, and HTTP servers from EMWAC are available either with the Microsoft Windows NT Resource Kit 3.5 or from the Microsoft Web home page. Telnet and Internet mail servers for Windows NT are also available on the Web, but only from independent third-party sites.

Installing these services on the Windows NT server was much easier than our Unix installation. To install the tools we just dragged the appropriate files into the System folder and rebooted the server. We could configure all three tools—DNS, Gopher, and HTTP—through the control panel.

After going through some of the well-organized, intuitive documentation provided with each product, we had the DNS, FTP, Gopher, and HTTP server up and running in under an hour. We were impressed with the usability and functionality that the Windows NT Internet tools provide.

If you are unfamiliar with Unix and are only looking to offer a few services, Windows NT is a great choice.—*ORT*

COST COMPARISON

	BBN Internet Server	Netra i5 Internet Server	Home Brew on Microsoft Windows NT	Home Brew on NeXTStep
Operating system	Berkeley Unix	Solaris 2.4	Microsoft Windows NT 3.5 Server ($800)	NeXTStep 3.3 ($799)
Internet capabilities	DNS, HTTP, Internet mail, News	DNS, FTP, Internet mail	FTP built in; free DNS, Gopher, HTTP	DNS, Internet mail, telnet built-in; free Gopher, HTTP, News*
Hardware	Intel-based PC with 16MB of RAM and 500MB hard disk	SPARCstation 5 with 32MB of RAM and 1 05GB hard disk; no monitor or keyboard	Dell OmniPlex DX2/50 with 32MB of RAM and 1GB hard disk ($4,900)	Dell OmniPlex DX2/50 with 32MB of RAM and 1GB hard disk ($4,900)
Total cost (list)	$9,850	$8,499	$5,700	$5,699

* We had to compile the source code for Gopher, HTTP, and News with a NeXTStep C compiler. A compiler is available in NeXTStep Developer 3.2 ($4,999).

WHERE TO GET IT

	Microsoft Windows NT 3.5 Server	NeXTStep 3.3
DNS	EMWAC DNS Server*	Built-in
FTP	Built-in	Built-in
Gopher	EMWAC Gopher Server**	Gopher (Gopher 2_1_3.tar.Z at *ftp://boombox.micro.umn.edu/pub/gopher/Unix/*)
News	EMWAC HTTP Server**	CERN HTTP Server (select cern_httpd_3 0.tar.Z at *http://www.w3.org/pub/bin/next-386*)
Internet mail	From third-party Web sites	Built-in
News	From third-party Web sites	INN (select inn1.4sec.tar.Z at *ftp://ftp.uu.net/networking/news/nntp/inn*)
Telnet	From third-party Web sites	Built-in

* Available in Microsoft Windows NT 3.5 Resource Kit.
** Available in Microsoft Windows NT 3.5 Resource Kit or at *http://www.microsoft.com.*

THE DIFFERENCE IS

Night and Day.

TimeVision NS is the Best Group Scheduler for cc:Mail Users

...and Microsoft Mail Users

...and Novell Messaging Users

...and DaVinci E-Mail Users

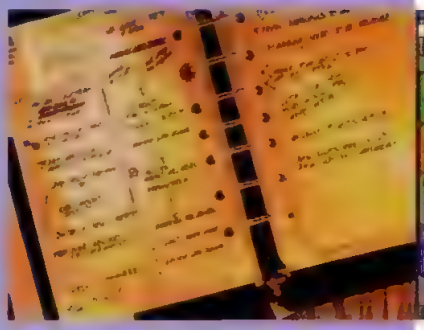
...and Beyond Mail Users

...and HP OpenMail Users

...and Notework Users

The Difference Is Night and Day

With TimeVision™ Network Scheduler™, you'll see a profound impact on how you manage your most valuable collective asset — *time!* Unlike Lotus Organizer™ or Schedule+®, products whose network and/or peer-to-peer limitations restrain group interaction, TimeVision Network Scheduler provides *unique groupness.* Through its streamlined calendar database, all users are served practical, interoperable information about their workgroups' time commitments — whether they are on or "off" the network! Powerful composite views of overlaid calendars in Day, Week, Month or Graph formats speed decision making for productive people. The "organizers" of the world can't even come close!!!



With or Without Your Favorite E-mail

Though E-mail is not a requirement, cc:Mail®, Microsoft Mail®, or any of the Novell NetWare® MHS-based messaging systems can be easily integrated with TimeVision Network Scheduler.

TimeVision NS: Simply the Best

The difference is "Night and Day." For *true* time management groupware, search no further. No peer-to-peer limitations. No compromise of group functionality for cosmetics.

"Unique Groupness" Says It All

TimeVision Network Scheduler provides the most concise and useful views of group calendar information available today. Find free time in seconds — your way. Reserve a conference room, a vehicle, and a piece of equipment. Keep projects on target. And because it works the way you do, TimeVision NS is the best way of keeping even the largest groups on the same page. Literally.

Ease of Administration

Use your E-mail's directory or your Novell NetWare bindery. Robust administrative tools give your organization the option of automated, "behind-the-scenes" maintenance plus real scalability. TimeVision NS grows with your workgroup and with your business!

CE SOFTWARE

P.O. Box 65580
1801 Industrial Circle
West Des Moines, IA 50265

At CE Software we support the efforts of our reseller partners. Please call for details regarding our Authorized Reseller programs.

YES! **Prove it to me! Send me TimeVision Network Scheduler NOW for the trial price of $29. (I want a full working 5-pak, not just some demo!) Call 1-800-523-7638 (CE709) or Fax 1-515-221-2258.**

Name _____ E-Mail _____

Company _____

Address _____ ☐ MasterCard ☐ VISA ☐ AMEX

City, State, ZIP _____ Card # _____ Exp. _____

Phone _____ Fax _____ Cardholder Signature _____

E-Mail Address _____

My Network Administrator's Name _____

Offer expires June 1, 1995. Coupon must be complete to take advantage of this offer. Limit one per business. Price includes shipping and handling. Sorry, minimum Purchase Order of $250, credit card or C.O.D. preferred. Offer good in U.S. and Canada only.

©1995 CE Software, Network Scheduler, and TimeVision NS are trademarks of CE Software, Inc. All other brand or product names are trademarks or registered trademarks of their respective holders.

CIRCLE 913 ON READER SERVICE CARD

This server's installation was simpler than the Netra i5 Internet Server's. And if you supply BBN with all the configuration information, such as network address and gateway information when you order, it will preconfigure the server prior to shipment. Then all you do is plug it in and you're up and running in minutes. In our case, we had to alter the IP configuration, which had changed since we had first supplied BBN with information. After a 15-minute phone call, our server was configured with the new information and ready to go.

BBN has attempted to provide a complete solution that includes every tool you'll need to set up Internet services, including DNS, e-mail, Gopher, HTTP, and News. The level of management for these tools is mixed. Some (e-mail, for example) can be easily managed through Frontdoor; for others, however (Gopher, HTTP, and News), Frontdoor offers little support. If you're adding newsgroups, you must edit configuration files manually. This can be cumbersome if you're looking to add all 8,000 groups currently available on the Internet.

Nevertheless, the BBN solution is a good option overall for many businesses. But if you're looking for performance and scalability, you'll want to consider the Netra for its fast bus and potentially better performance.

BBN Internet Server. *List price: $9,850. BBN Internet Services Corp. (a Division of Bolt Beranek and Newman Inc.), 150 Cambridge Park Dr., Cambridge, MA 02140; 800-472-4565; fax, 617-873-5620; Web,* http://www.bbnplanet.com/.
Circle 952 on reader service card

Security Alert

With the movement of the Internet away from the halls of universities and government institutions and into corporate boardrooms, one thing has become clear. The Internet is not secure (at least not yet), and it poses a security risk for today's companies.

Stories about hackers breaking into everything from defense contractors' networks to Internet Service Providers' systems (to steal thousands of credit card numbers) are rampant. So how can you protect your LAN and your valuable data from the unscrupulous Internet intruders?

Security can come in a couple of different forms. You can use access control lists (ACLs) on your routers, which control access to your network, either by filtering on IP address or by defining TCP port numbers. Most seasoned hackers, however, have very little problem breaking through routers with ACLs. Instead, go for a *firewall*—probably the highest level of security that you can have today. Firewalls protect your LAN by filtering all network packets that cross your wires.

Firewalls are effective, but they come at a price. They are complex and require a thorough knowledge of network topologies, IP subnetting, and router-configuration parameters. Moreover, all firewall products, such as Firewall-1 from CheckPoint Software (distributed by SunSoft) and Borderware, from Border Network Technologies (formerly called Janus Firewall and distributed by Sea Change), should be tools that you use to implement a carefully planned security policy. Without planning, it is too easy to make costly mistakes and cause more damage than good. (For example, you could easily cause all of your internal users to lose access to the outside world, while still leaving your network vulnerable.) In addition, many firewalls, including Firewall-1, require a high-end Unix workstation, such as a Sun SPARCstation, to operate.

There are generally two schools of thought on the type of protection firewalls can provide: port-level and application-level filtering. In port-level filtering, a firewall examines every packet header against its ACL. For example, in configuring the Firewall-1 software during some ad hoc testing, we had to specify the IP addresses of each host that was allowed to access the LAN. This method causes some latency in a network since the software has to check every packet that crosses the gateway.

Application-level filtering is considered more secure. It is also more complicated to configure and manage and has more overhead than port-level filtering products. In application-level filtering, the firewall authenticates every packet that goes through the network at the application level. This is a much higher level of security.

Whichever method of protection you choose, make sure that you have a well-thought-out security plan before purchasing any security tools.—*ORT*

IT Solutions

The Neticity Workstation

Here's a product that represents an interesting mix of vendors in an authoring and server system for the Web. IT Solutions' Neticity Workstation (developed in part by Canon, of "image is everything" fame), combines the NeXTStep OS with a specially designed Intel 486 PC that includes high-speed video and a VL-Bus for better overall performance. The Neticity includes the NCSA version of the HTTP server and an impressive object-oriented HTML authoring tool from Pages Software.

From an authoring perspective, Pages takes full advantage of NeXTStep, which itself offers a unique combination of Unix performance and scalability, along with its advanced object-oriented interface. This mix enhances not only usability, but the feature set as well. For example, Pages takes full advantage of NeXTStep's drag-and-drop capability for creating your pages. Pages also lets you easily import documents from popular word processors to your HTML document. The WebForce has only a rudimentary import facility. But like the WebForce, Pages offers a number of predefined templates for configuring your HTML documents.

For basic Web-server functionality, though, IT simply includes the NCSA HTTP software (also available free on the Internet). Although this makes the Neticity a functional Web server, management and configuration can be difficult if you are not familiar with Unix—compared to, say, the Netsite Communication Server on the WebForce. But the NCSA server is the most popular server running on the Web today and has proven over time to be robust and to perform well.

For installation and configuration, IT preconfigures all the software. But like the WebForce, the Neticity has no tools to automate the setup of the network portion of the server. This is where NeXTStep's GUI management environment comes in. In our testing, we had to do only two things: First, using the Simple Network Starter, we entered all the network information; second, because the Simple Network Starter does not offer an option for DNS, we manually had to create a resolv.conf file

TAKE CONTROL
—of—
YOUR NETWORK

The Intel EtherExpress™ PRO/100 network adapter virtually eliminates bandwidth problems by delivering 100Mbps performance.

It maximizes performance of your Pentium® processor-based PCs through increased bandwidth and throughput.

The PRO/100 automatically senses the hub's speed, then switches to 10Mbps or 100Mbps, for seamless integration into existing LANs.

We've also added new Token Ring and 10Mbps Ethernet cards to our full line of PRO adapters.

1-800-538-3373
Call ext. 962 to qualify for a special trial price.
Or find us on the Web at http://www.intel.com.

Introducing the Intel 100Mbps Fast Ethernet adapter. A powerful addition to your fastest PCs.

intel®

WILL YOUR DEVELOPMENT TEAM TAKE TWO STEPS FORWARD TODAY.

You navigate along a thin line to keep your team on track. Fortunately, for C++ developers creating applications for Windows® 95, Microsoft® has a core set of products designed to ensure they continue moving ahead.

Microsoft® Visual C++™ development system provides a powerful, tightly integrated tool set, including the Microsoft Foundation Class Library: 70,000 lines of pre-built, pre-tested code to give you a head start. With a

Visual C++ Subscription, three times a year you're updated on the latest tools and technologies, including new features for Windows 95 development. That way, you'll get applications up and running quickly, and Windows 95 ready.

Microsoft SourceSafe™ and Microsoft Test keep your team on course. SourceSafe's project oriented approach to source code control promotes code reuse and management of multiple releases for development teams of any size. Test is an automated testing tool which evaluates applications throughout the development process. Together, they help find errors and regressions while identifying where the problems occurred.

By joining the Microsoft Developers Network, via quarterly CDs, you'll get in-depth technical information, operating systems and software development kits. Right there on your desktop. More importantly, you can get a pre-release version of Windows 95 operating system and the SDK.

These are just part of our line of products and services designed for your development teams. For more information and the name of your local reseller, call 1-800-719-5577, Dept. P3X. We'll even send you a free CD, the Microsoft Roadmap to Developer's Products & Services, describing all our tools and programs. That way, you'll have everything you need to continue in the only direction you want to go.

Microsoft

WHERE DO YOU WANT TO GO TODAY?™

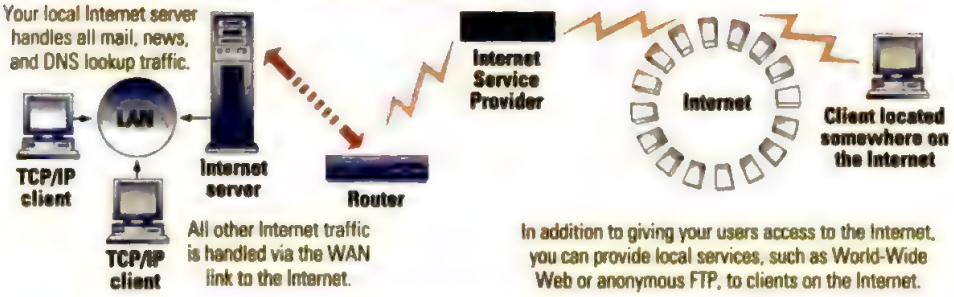
© 1995 Microsoft Corporation. All rights reserved. Microsoft, Windows and SourceSafe are registered trademarks and Visual C++ and "Where do you want to go today?" are trademarks of Microsoft Corp.

OR
ONE STEP BACKWARDS?

CONNECTING YOUR BUSINESS TO THE NET

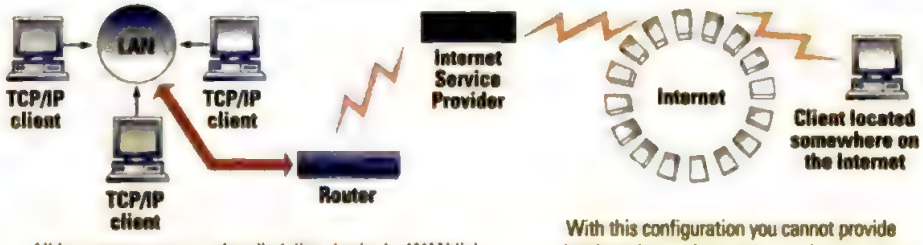
With Your Own Server

Your Internet server maintains the mail gateway—and the DNS and News servers—in order to provide local access to users. The benefits are better performance and the ability to set up personalized domains. One drawback is the high cost of management and installation.



Without Your Own Server

Under this scenario, all your services are provided by the Internet Service Provider, which maintains your e-mail gateway, and your DNS, HTTP, and News servers. The benefits are lower cost and easier setup, because you don't have to establish and maintain a local server. The drawbacks are that your users must access the services via slow WAN links, and you don't have private domains for your e-mail.



that pointed to our DNS server. Even with all that, we were up and running in about a half hour.

The Neticity, with its excellent authoring tool and object-based OS, is a great solution for any size business that is looking to publish and serve HTML documents on the Web.

The Neticity Workstation. *List price: With Web authoring system only, 24MB RAM, and 500MB SCSI hard disk, $7,000; Professional System with 32MB RAM, 1GB SCSI hard disk, CD-ROM drive, and HTTP server, $8,595. IT Solutions, 500 W. Madison St., #2210, Chicago, IL 60661; 800-394-4487; fax, 312-479-9361; Web,* http://www.its.com/.

Circle 953 on reader service card

Silicon Graphics Inc.

WebForce

Another veteran of other computer markets offers up an entry in this one. Silicon Graphics Inc. (SGI) has been producing powerful graphics and server platforms for a number of years. With the introduction of WebForce, SGI combines the strengths of those platforms to offer a complete Web server and HTML authoring station that makes creating and serving HTML documents a snap.

The server portion of the WebForce is the Netsite Communications Server software, from Netscape Communications Corp. The authoring tool is based on source code licensed from another company, but SGI has enhanced it substantially. SGI combines the two tools over an object-oriented platform running on IRIX (a strain of Unix) and fast hardware. You can drag and drop graphics when you're creating Web pages, then serve those pages over the Internet—all from the same platform.

Installing and configuring the WebForce was relatively straightforward. The product came to us preconfigured with all the necessary software, but configuring the network was a bit more complicated than with the other servers. Familiarity with IRIX would help. SGI offers no configuration tools beyond what the OS offers. We had to resort to calling SGI support to resolve our configuration issues.

Once you correctly configure the network portion of the WebForce, management of the Web server is simple. The server software starts automatically during start-up, and most of the management takes place through the Netsite software. Then you're set to begin creating HTML pages.

For this undertaking, SGI offers an excellent authoring tool that lets you create attractive HTML documents combined with graphics, sound, and movie clips—without needing to know HTML codes. A set of intuitive tools lets you create headlines, insert images, and size fonts easily. The product also includes a number of predefined templates, or styles, that make creating attractive documents simple.

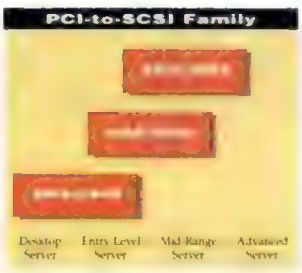
The process of creating documents is, however, more difficult than with the Pages software on the Neticity Workstation. For example, Pages offers a complete drag-and-drop solution, and even automatically indexes the files in a single directory. This is something not found with the SGI authoring tool.

Overall, the combination of the powerful WebForce platform with the excellent authoring tool makes this product an attractive buy if you're looking for a complete Web solution.

WebForce. *List price: with 8-bit color, 32MB RAM and 1GB hard disk, $10,995; with 24-bit color, 32MB RAM and 1GB hard disk, $17,495; with high-end 3-D authoring, 128MB RAM, and 2GB hard disk, $45,200. Silicon Graphics Inc., 2011 N. Shoreline Blvd., Mountain View, CA 94943-1389; 800-800-7441; fax, 415-961-0595; Web,* http://www.sgi.com/.

Circle 954 on reader service card

Build a better server with Adaptec. When the calls turn to pounding on your door and everyone is shouting, "We can't access our files!" You begin to wonder if managing server-based storage needs to be this hard. Adaptec® will change the way you configure servers forever. We've taken I/O beyond basic SCSI connectivity and addressed the key network storage concerns of: Manageability, Availability, Performance and Scalability.



We have a SCSI host adapter for any size server — and Adaptec CI/O software is available with them all.

The new Adaptec CI/O™ remote monitoring and management software gives you insight into all SCSI devices connected to all of your servers. From a single server down the hall, to 100 networked servers across the world.

You'll also see increased performance with our new multichannel PCI-to-SCSI host adapters. The AHA®-3940 relieves bottlenecks by letting you spread drives across separate SCSI channels on a single card, taking full advantage of your server's PCI performance. For improved data availability, the new AHA-3985 PCI RAID adapter makes RAID 5, 1, 0, or 0/1 all economically attractive for entry- and mid-range servers.

Adaptec IOware PRODUCTS

Call Adaptec at 1-800-934-2766 ext. 2225*. We'll send you information, a demo diskette of the Adaptec CI/O software and a booklet from the RAID Advisory Board. Then you can stop screaming and take the weekend off.

adaptec®

I/O. NOW MORE IMPORTANT THAN EVER.

* For information by fax, dial 1-408-945-2570, ext. 2225, request document no. 23110 ©1995 Adaptec, Inc. All rights reserved. Adaptec, the Adaptec logo, IOware, CI/O, AHA, and are trademarks of Adaptec, Inc. which may be registered in some jurisdictions.

CIRCLE 934 ON READER SERVICE CARD

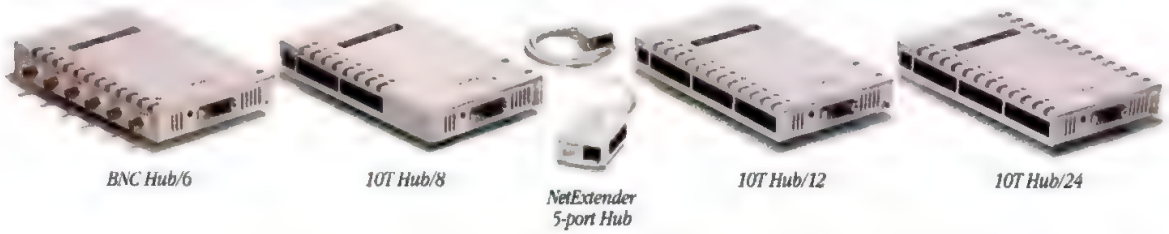
IT HANDLES 10,000,000 BITS PER SECOND IT AUTOMATICALLY ISOLATES TROUBLE IT CONNECTS UP TO 24 USERS

AND PEOPLE STILL CALL IT A DUMB HUB. WE CALL IT A SMART CHOICE.

Asanté™ Plug-and-Play hubs are anything but dumb. For example, if there is a problem on any workstation, they have auto-partitioning capabilities to isolate that port so as not to affect overall network performance. Additionally, troubleshooting is fast and easy with Asanté's unique oversized LEDs. They instantly show if there is a problem with any port connection. Like all Asanté products, these hubs deliver high-performance backed by lifetime warranties and free technical support.

So call 1-800-662-9686, Dept. 500 today for more information and a FREE copy of our Guide to Ethernet Networking. Because when you consider all the Asanté Plug-and-Play hubs can do, they're more than just smart. They're brilliant.

ASANTÉ™
ALL THE RIGHT CONNECTIONS™
CIRCLE 902 ON READER SERVICE CARD



BNC Hub/6 *10T Hub/8* *NetExtender 5-port Hub* *10T Hub/12* *10T Hub/24*

Asanté Technologies, Inc., 821 Fox Lane, San Jose, CA 95131, Tel: (408) 435-8388. E-mail: sales@asante.com, Fax back: (800) 741-8607

Resellers. Asanté products are available from Ingram Micro, Tech Data, Merisel, Gates/Arrow, MicroAge, Intelligent Electronics, GBC/Vitek and Globelle

© 1994 Asanté Technologies, Inc. All brand names and products are trademarks or registered trademarks of their respective holders.

Come see our Fast Ethernet products at NetWorld+Interop, booth #1002.

Sun Microsystems Computer Co.

Netra i5 Internet Server

It's not often that we run into real "firsts" at *PC Magazine*, but here's one. The Netra i5 Internet Server not only doesn't support a monitor or keyboard, but it uses prerecorded voices (in the language of your choice) to inform you of the server's status.

Overall, Sun Microsystems Computer Co. has the right idea with the Netra. It's a real move toward a plug-and-play server that tries to provide only the basic services you need. Still, it lacks some things a small to medium-size business would need—such as a News server or an HTTP server. Sun says it will be adding more basic services in its next release, slated for the middle of 1995.

The Netra is a preconfigured SPARCstation 5 workstation running Solaris 2.4, loaded with DNS, e-mail, and FTP services. Most management takes place through the serial port, but Sun doesn't provide the $10 null modem cable required to connect a terminal to the Netra. We had to experiment with eight different cables before we found the one that worked. This should change.

When we turned on the system a female voice told us that our server was not configured. From that point we had two options: Provide our network information to Sun (or our ISP) so it could create a floppy disk to configure the server automatically, or use the included manual configuration utility.

At our labs we decided to test the manual configuration. The application for entering all your network information, such as IP address, DNS host information, and gateway address, is menu-driven. This tool was an excellent alternative to entering the information manually in the Unix configuration files. We were up and running in less than 15 minutes.

Once installation is complete, all management of the server takes place through an intuitive, though buggy utility called iadmin, which lets you add and delete users, create mail accounts, and change configuration information. Some of the Netra's bugs are annoying, though. For example, it could not correctly back up our configuration information to floppy disk.

In the Netra, Sun delivers an impressive solution that has a few shortcomings in this iteration. Granted, a number of the missing tools—such as a News server or an HTTP server—are available on the Internet, but you still would need to configure all the necessary files manually. This is a complex process if you are unfamiliar with Unix commands. Still, the Netra will be a good solution for many businesses looking for basic services.

Netra i5 Internet Server. *List price: With 16MB RAM and 535MB hard disk, $6,149; with 32MB RAM and 1.05GB hard disk, $8,499. Sun Microsystems Computer Co. (a Sun Microsystems Inc. Business), 2550 Garcia Ave., Mountain View, CA 94043; 800-821-4643; fax, 415-969-9131; Web,* http://www.sun.com.

Circle 955 on reader service card

GLOSSARY

Internet Server Terms

Authoring tool Software that creates an *HTML* document for publication on the *World-Wide Web*

Daemon A program that runs in the background on a *Unix* workstation, waiting to handle requests. Examples include e-mail programs, print spoolers, router software, and schedulers that initiate other programs at specified times. A daemon is similar to a TSR in the DOS world.

DNS Domain Name Service, a means by which numeric IP addresses are converted into character-based names and vice versa.

Firewall Software that restricts traffic to a particular area of a network by filtering all IP packets that pass through a given node.

FTP File Transfer Protocol, the protocol that defines the transfer of files between a host and a remote station on an IP-based network.

Gopher A simple *TCP/IP* tool that allows you to organize and display information within a hierarchical menu system.

HTML Hypertext Markup Language, a scripting language that is used to write *World-Wide Web* documents. Hypertext allows a document to be linked to an unlimited number of other documents on the Web. There are currently four levels of HTML compliance that adhere to the *SGML* standard.

HTTP Hypertext Transfer Protocol; the protocol that is used to transfer data to and from *World-Wide Web* browsers.

HTTP server A machine that makes a *World-Wide Web* document available to Internet users.

ISP Internet Service Provider, a commercial company that offers individual access to the Internet.

Leased line A telephone line rented for dedicated access to the Internet.

Network News Transfer Protocol (News, or NNTP) A *TCP/IP* protocol that defines how newsgroup messages are posted and transported between services.

PPP Point-to-Point Protocol, the protocol that allows a machine to connect to the Internet via a standard phone line and a high-speed modem.

SGML Standard Generalized Markup Language, a standard for defining and managing the structure of digital documents. SGML separates a document into three components: the header file, which specifies how the document is to be run on a given system; the document type definition (DTD), which describes the layout of the document's components; and the instance, which contains the actual text. *HTML* is a subset of this standard.

SMTP Simple Mail Transfer Protocol; the protocol that defines the transfer of e-mail between nodes on an IP-based network.

TCP/IP Transmission Control Protocol/Internet Protocol; a collection of communication protocols that allow dissimilar PCs to speak to one another over a common network. It was originally developed by the U.S. Department of Defense in the 1970s.

Telnet A terminal emulation protocol that allows an Internet user to log on to other stations remotely; also, a program based on this protocol.

Unix A multithreaded, multitasking operating system that was originally developed by AT&T in the late 1960s. There are many strains or versions of Unix. Much of the Internet was established on Unix systems, and Unix is still often used as a base for large-scale Internet access.

WAIS Wide Area Information Service, a search engine that can look up information on the Internet according to keywords.

World-Wide Web (the Web, or WWW) A TCP/IP-based network of multimedia documents that are connected via hypertext links. All documents are authored using *HTML*.

—*Cade Metz*

Your phone and computer will click like never before.

It's time *your telephone* and *PC started* talking the *same* language.

Let your computers work the phones.

Call for a free game disk. Discover the power of Passage to The Rich & Famous.

Next time you're at your desk and the phone rings, imagine having the name of the client who's calling you pop up on your PC. Along with his current files. And imagine never having to keep track of incoming and outgoing calls again. Because it's done for you. Automatically.

AT&T not only imagined it. They created it. It's called **PassageWay™ Solution.** It works with AT&T's Communications Systems and your individual or networked PCs. Providing a crucial link between communication and information. So you can work the way you *want* to, not the way you have to.

Call 1 800 325-7466, ext. 485, today. And ask about the AT&T **PassageWay Solution.** Because, if you're looking for a way to make your business more efficient, we speak your language.

AT&T. Where innovation leads.

AT&T

© 1994 AT&T

CIRCLE 915 ON READER SERVICE CARD

First Looks

HANDS-ON REVIEWS OF NEW SHIPPING PRODUCTS

GROUPWARE

Manage More than Your Contacts

By Tony Pompili

Data Fellows' new Vineyard, Version 1.1.1, is designed to help simplify the daunting task of managing and organizing files, documents, and contact information. While the friendly interface makes Vineyard an easy-to-use solution for small networks, the product does not scale well, making it a poor choice for larger LANs. Also, Vineyard is somewhat pricey ($2,700 for 10 users) and does not work with MAPI or VIM mail systems.

Vineyard can be used to track a variety of information about your contacts, such as company and employee names, using visual mapping tools and a friendly drag-and-drop interface. Unlike a basic PIM, however, Vineyard can also organize documents, including word-processor, spreadsheet and presentation-graphics files.

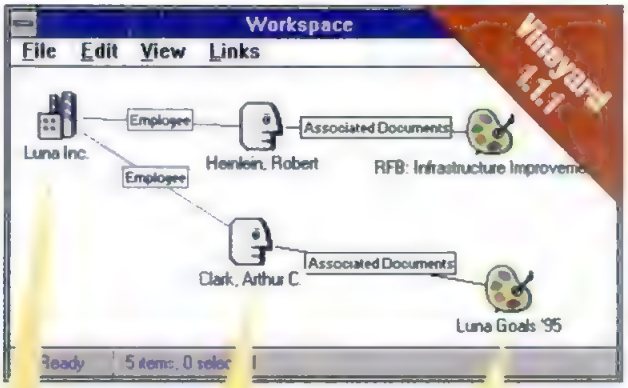
Each piece of information—or object—is categorized as one of the following: person, company, user, user group, memo, spreadsheet, or external document. Folders contain groups of related objects, such as all the entries pertaining to a particular company. You can view each folder as a name list or as a group of icons. The latter, like the product in general, have a strong Macintosh look and feel.

Within folders, you can link objects to an unlimited number of similar objects using forms and Vineyard's Connection feature. For example, to link an employee to a company, you highlight the employee's name then drag and drop it to the company form's Connection box. A special folder—called a link view—also lets you create links simply by drawing lines between two objects. Once links are established, you can use them to move through related information by simply mouse-clicking on successive objects.

Any Vineyard user with write access (provided by the administrator) can add new folders to the network. Folder properties, such as rights to read, write, or delete objects and folder names, can be created or changed via the Information tool on each user's menu bar. Each individual user also has a Workspace folder, which allows the user to customize the desktop.

Vineyard includes built-in word-processing and spreadsheet applets (Memo and Spreadsheet), but these are included only for convenience. Fortunately, you can track and create object links using documents from most popular third-party applications.

When opening an object or accessing a link, Vineyard users must be connected to a shared directory on a common file server. The product isn't tied to any particular network OS, but it does require that all of a server's users be set up with identical drive mappings to the same file server in order to share information.



TRACING THE VINE: Associations between Vineyard objects can be displayed with icons, lines, and link labels.

While useful for smaller groups, Vineyard simply is not a viable solution for enterprise networks. For one thing, only one database can be active on a Vineyard server at any given time. This is not well suited, for example, to environments where the sales department needs to use one database and the research department another. Also, there is no way to connect multiple servers via WAN or dial-up links. While you can have multiple servers running different Vineyard databases, all users of a particular database must share the same Vineyard server *and* file server. Also, the package does not include any remote-user support.

As a workgroup communications program, Vineyard also falls short since it does not tie into existing e-mail systems like cc:Mail or Microsoft Mail. An e-mail applet is included with Vineyard, but since it does not work with MAPI or VIM, Vineyard users either have to use the applet exclusively or run two different mail systems.

Vineyard, Version 1.1.1. *List price: For 10 users, $2,700; for 25 users, $5,800; for 50 users, $10,500. Data Fellows Inc., 1616 N. Shoreline Blvd., Mountain View, CA 94043; 415-694-7150; fax, 415-694-7070.*

Circle 951 on reader service card

PEER-TO-PEER NETWORKING

A Four-Star Bundle from Artisoft

By Steve Rigney

As your network grows, so does your need for tools that provide remote access, storage management, modem sharing, and overall network management. But a pile of separate software tools to perform these jobs can easily run in excess of $1,000—a rather steep price, especially for small peer-to-peer LANs.

Enter the Artisoft LANtastic Utility Pack ($349), which solves this problem for LANtastic users. The LANtastic Utility Pack is a bundle of four utilities: ArtiSave backup software, Microcom Carbon Copy for Windows remote-control software, LANtastic Management Services (LMS) Basic, and ArtiCom for network modem sharing. Purchased separately, these products would cost more than $700.

This bundle is a great way to add features and capabilities to your LANtastic network. The

Continues on page NE20

First Looks

Artisoft

Continued from page NE19

only thing we feel could be improved is the installation, which is disjointed. Each utility has a separate installation routine, and there is no integrated process for installing all the utilities from a common menu. Still, for the price, the LANtastic Utility Pack is hard to beat—even if you use only two or three of the utilities. And if you need more features than this product provides, you can separately purchase add-ons for ArtiSave and LMS.

WHO'S GOT THE REMOTE?

The most useful component in the LANtastic Utility Pack is Carbon Copy. You can use this package to dial into your LANtastic network from a remote location and take control of a network client or file server. As with any remote-control package, Carbon Copy lets you launch applications, send e-mail, and troubleshoot common network errors once you're connected to the network. Carbon Copy provides its own security in the form of user names and passwords, and it also implements LANtastic's built-in security when you're connected.

While most users will use Carbon Copy only to dial into the network, you can also use this package to set up a gateway for dial-out service to your LANtastic network. You can configure the Carbon Copy gateway to allow users to dial out across the network using any DOS- or Windows-based communication package that works with the NetWare Communications Server Interface (NCSI) modem-sharing specification, a common capability in modern programs. If your remote PC does not run Windows, you will have to fork over an additional $40 to purchase Carbon Copy for DOS. Or you could use a different DOS-based remote-control package, such as Symantec's pcAnywhere, to connect to your network.

WE GOT YOUR BACK

The ArtiSave utility lets you back up all your LANtastic servers—except those running over OS/2—to a single quarter-inch cartridge (QIC) tape backup device attached to a server or a client PC. We found ArtiSave very similar to Symantec's Norton Backup for Windows: easy to use and efficient.

You'll need to be careful about one detail, however. Most QIC tape backup devices, such as the Colorado Jumbo 250, allow you to back up only about 300MB of data. Even on small networks, you (and your users) won't take long to exceed this amount of data. If you need more data capacity or want to use a high-end DAT drive, you'll need to go with ArtiSave for SCSI ($50).

SHARE AND SHARE ALIKE

ArtiCom, a DOS-based modem-sharing utility, lets you dial out from any client PC using a modem connected to a LANtastic server. This configuration is great if you don't want to install individual modems and phone lines for each PC on the network, but you must use a communication program that works with interrupt 14 (INT14) in order to access the shared modem. This should not cause too many problems, though, because most comm packages now support INT14.

ArtiCom works with up to 32 modems connected to a single server. The utility also provides a DOS-based terminal program that you can use for basic dial-up needs.

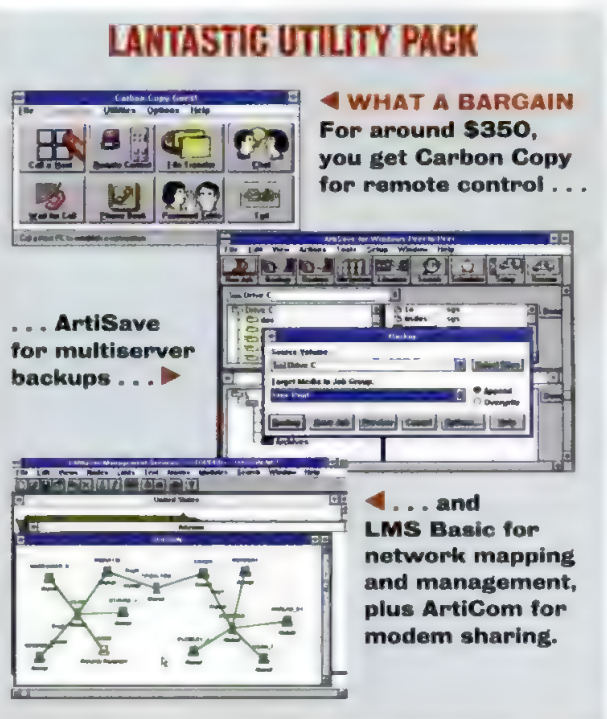
ONE-STOP MANAGEMENT

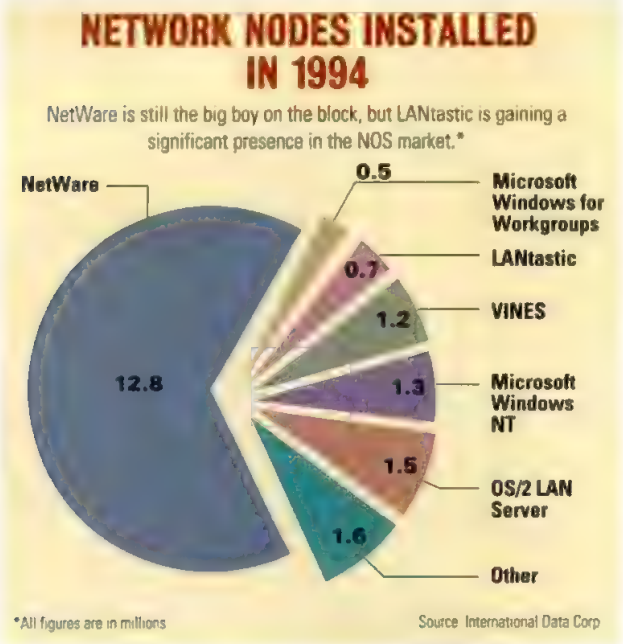
The LMS utility allows you to monitor every PC on your network. You can create a graphical map of your entire network and view a wealth of information, including connection status, available disk space, and even some network performance statistics. LMS is not nearly as advanced as Visisoft's Visinet and other network-mapping and -management products, but it does the job and does it well.

The Basic version of LMS is included in the LANtastic Utility Pack, but you can upgrade to the LMS/Advanced utility ($399), which adds hardware and software inventory features as well as several customization features and support for DDE.

LANtastic Utility Pack. *List price: $349. Artisoft Inc., 2202 N. Forbes Blvd., Tucson, AZ 85745; 800-233-5564; fax, 602-670-7101.*

Circle 969 on reader service card





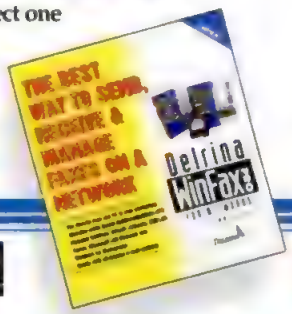
We've Made Network Faxing Easy and Affordable

Delrina has put the benefits of network faxing within your reach. Meet Delrina WinFax PRO for Networks™ 4.0 – the easy, affordable way to share fax modems and telephone lines across your network.

The benefits of WinFax PRO for Networks are enormous. Save the expense of buying individual fax modems and telephone lines. Make your people more productive, by letting them fax directly from their own PC. And, WinFax PRO for Networks is so easy to use and implement that you can have your entire group up and running in no time.

Easy to Use.

Network faxing is now as easy as printing from your PC. Using the world's best-selling, most award-winning fax software, WinFax PRO™ 4.0, you can send faxes directly from any Windows application. Then, choose any fax modem on your LAN or let WinFax PRO for Networks select one for you. To send a fax to a group of people,



New Delrina WinFax PRO for Networks 4.0

WinFax PRO for Networks will even use up to four modems at once. And because everything takes place in the background, you can continue working while you fax.

Affordable.

WinFax PRO for Networks is the most affordable solution for groups of up to 50 people. You don't need a dedicated fax server. Start off with a few users sharing one fax modem and grow until everyone in your department is faxing. To expand, simply add more fax modems – up to four per server and 16 per workgroup, with as many workgroups per LAN as you need. To add more users, simply purchase affordable 10, 25 and 50 volume user packs.

Compatible.

WinFax PRO for Networks also integrates with your existing hardware and software. It supports over 600 popular fax modems. It works with all popular networks including Novell NetWare,™ Microsoft Windows for Workgroups® 3.11 and Artisoft LANtastic.™ Plus, it routes faxes using all popular e-mail packages like Microsoft Mail™ (MAPI), Lotus cc:Mail™ (VIM) and all MHS-compatible systems. If you don't have e-mail, simply forward faxes directly to another WinFax PRO user over your network.

Call Today!

The benefits of network-based faxing are now within your reach. WinFax PRO for Networks gives you an easy and affordable way to put faxing where it belongs–on your network.

Call now for information or to upgrade from WinFax PRO or see your local dealer.

DELRINA

1-800-315-5845

Delrina, WinFax PRO and WinFax PRO for Networks are trademarks of Delrina Corporation and its affiliated companies. Microsoft is a registered trademark of Microsoft Corporation. All other product names are trademarks of their respective owners. © 1994 Delrina (Canada) Corporation. All rights reserved.

CIRCLE 912 ON READER SERVICE CARD

YOU'RE

LOOKING AT

EVERY

SYSTEM

DEVELOPED

EXCLUSIVELY

FOR

WINDOWS NT.

RISCserver, RISCstation, See, Hear and Feel the Difference are trademarks of NEC Technologies, Inc. Pentium is a trademark of Intel Corp. All other trademarks and registered trademarks are the property of their respective owners. For information via FastFacts™ call 1-800-366-0476. For RISCserver information, request doc. #97774721. For RISCstation information, request doc. #74720000. © 1995 NEC Technologies, Inc. NEC GSA #GSOOK94AGS5241.

NEC RISCstation 2000

NEC Express RISCserver

You can look around all you like, but you won't find a system that can run Windows NT™ like NEC's RISCstation 2000™ or Express RISCserver.™ The reason is simple. While other workstations and servers are designed with multiple operating systems in mind, ours were designed exclusively for Windows NT (both are optimized for NT right down to the ASIC level). The result is speed. Up to two times the speed of Pentium™ processor systems. With superior floating point accuracy. If you're interested in that kind of performance, call 1-800-709-3434 for more hard facts. After all, if you've decided on Windows NT, why not consider the RISC systems that get more out of Windows NT.

MIPS RISC CERTIFIED POWER

MICROSOFT WINDOWS NT

SEE, HEAR

AND FEEL THE

DIFFERENCE.™

NEC

CIRCLE 908 ON READER SERVICE CARD

First Looks

FAST ETHERNET

Raising the Stakes

By Charles Lin and Russell Iwanchuk

3Com Corp. has officially entered the Fast Ethernet market and is challenging other vendors with high performance and innovative technology. The 3Com Fast EtherLink PCI 10/100 Parallel Tasking Adapter ($285) offers many advanced features and compares well with the other 100Base-TX PCI adapters we've seen to date; it even outperformed Intel's EtherExpress PRO/100 PCI—the Editors' Choice in our Fast Ethernet adapter roundup two issues ago—on most of our throughput tests. But despite its high performance, the Fast EtherLink's CPU utilization was higher than that of the PRO/100.

There's more to the Fast EtherLink than performance and CPU utilization, however. Like other 10/100 adapters we've seen, this card uses auto-sensing to switch automatically between 10Base-T and 100Base-TX networks. Auto-sensing is an excellent feature if you are planning to upgrade to 100 Mbps in the future, since it allows you to install Fast Ethernet adapters prior to changing the network entirely to 100 Mbps.

Also, the Fast EtherLink provides 3Com's Parallel Tasking technology. Like the 3Com EtherLink III Model 3C509, one of the highest-performing and most efficient 10-Mbps Ethernet cards on the market, the Fast EtherLink uses Parallel Tasking to increase performance by sending packets to the PC bus without waiting to receive the entire packet.

Finally, the Fast EtherLink can utilize either programmed I/O or bus-mastering techniques when communicating with the PC bus. For traffic comprising mostly small packets, programmed I/O, the default method by which NICs pass data to the PC's system memory, will deliver the highest throughout. On the other hand, bus mastering reduces the burden on the system CPU, especially when the card handles large packets. One important note: The Fast EtherLink will work even in non-bus-mastered PCI slots; other Fast Ethernet cards cannot. 3Com backs this claim with a money-back guarantee.

IN PRACTICE

Installation was easy. It was easier, in fact, than you'd expect from a typical 10Base-T adapter: As a PCI card, the Fast EtherLink raises no interrupt-conflict issues. The adapter shipped with a full suite of NetWare LAN and ODI drivers, as well as NDIS 2.0 drivers.

On our 16-client test-bed, the Fast EtherLink ran neck and neck with the PRO/100 and delivered almost 80-Mbps throughout when configured as the server adapter. This impressive showing was marred somewhat by poor CPU utilization, however.

As a client card, the Fast EtherLink consistently outperformed the PRO/100—but not by much.

3Com Fast EtherLink PCI 10/100 Parallel Tasking Adapter. *List price: Single adapter, $285; five pack, $275 per adapter. 3Com Corp., 5400 Bayfront Plaza, P.O. Box 58145, Santa Clara, CA 95052-8145; 800-638-3266.*

Circle 967 on reader service card

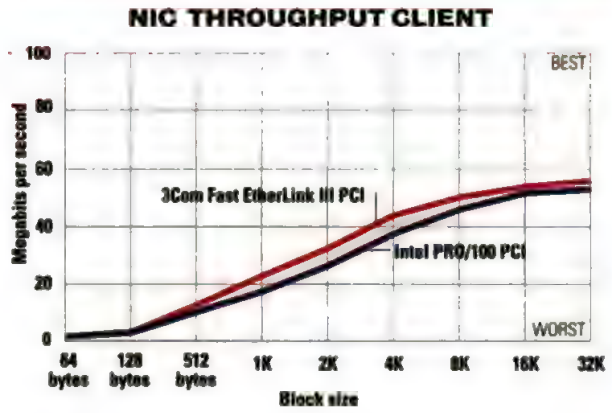
BENCHMARK TESTS

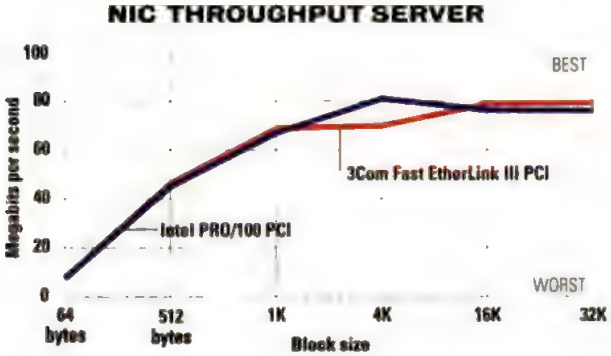
Fast Ethernet Adapters

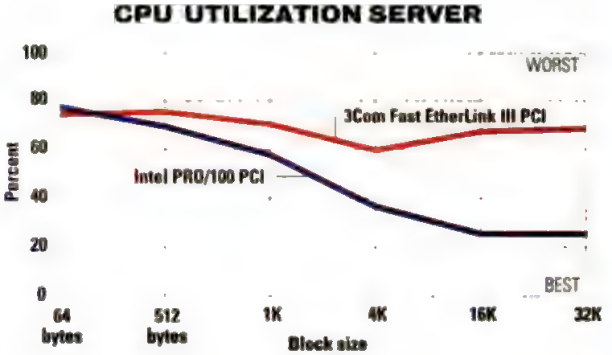
PC MAGAZINE LABS

We ran the 3Com Fast EtherLink III PCI and Intel PRO/100 PCI through the NIC Throughput test from NetBench 3.0. Thanks primarily to its Parallel Tasking architecture, the Fast EtherLink outperformed the PRO/100 as a client card with every block size—but only by the slimmest of margins.

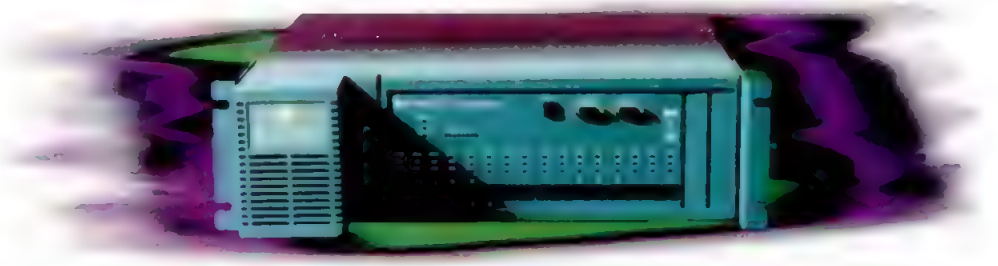
Both adapters performed well as server cards, and neither showed a clear throughput advantage. But the inefficiency of the Fast EtherLink became apparent on our CPU Utilization test, conducted using Novell's STAT.NLM. Although both cards started out high (over 70 percent utilization), the PRO/100's numbers improved steadily and dramatically with larger block sizes.







When YOU're choosing an Ethernet SWITCH, make a *fast* decision.



With Plaintree's WaveSwitch 100, you get high throughput Ethernet Switching and 100Mbps connections for file servers and backbones that will supercharge your network. Talk about fast.

Reach speeds of up to 100Mbps.

And WaveSwitch 100 offers the greatest flexibility in the industry to connect between Ethernet segments and 100Mbps backbones. Whether it's the WaveSwitch 100 8-port, 16-port or 12-port fiber optic switch, modular components provide for FDDI, 100Base TX, 100VG-AnyLAN and Plaintree's own fiber optic Fast Ethernet. Therefore, it will adjust to any network and protect your initial investment. Plus WaveSwitch 100 is simple to install and offers a variety of media connections, such as Fiber, AUI or BNC, to access files at 100Mbps. All at a low cost.

So before you choose an Ethernet Switch, take a WaveSwitch 100 for a free test run with our **30-Day Free Evaluation Program.** **Call 1-800-YES 30 DAYS ext. 30** to qualify. You can also get a free copy of our Report Card that shows how the leading publications and testing labs have ranked WaveSwitch 100.

PLAINTREE®

SYSTEMS

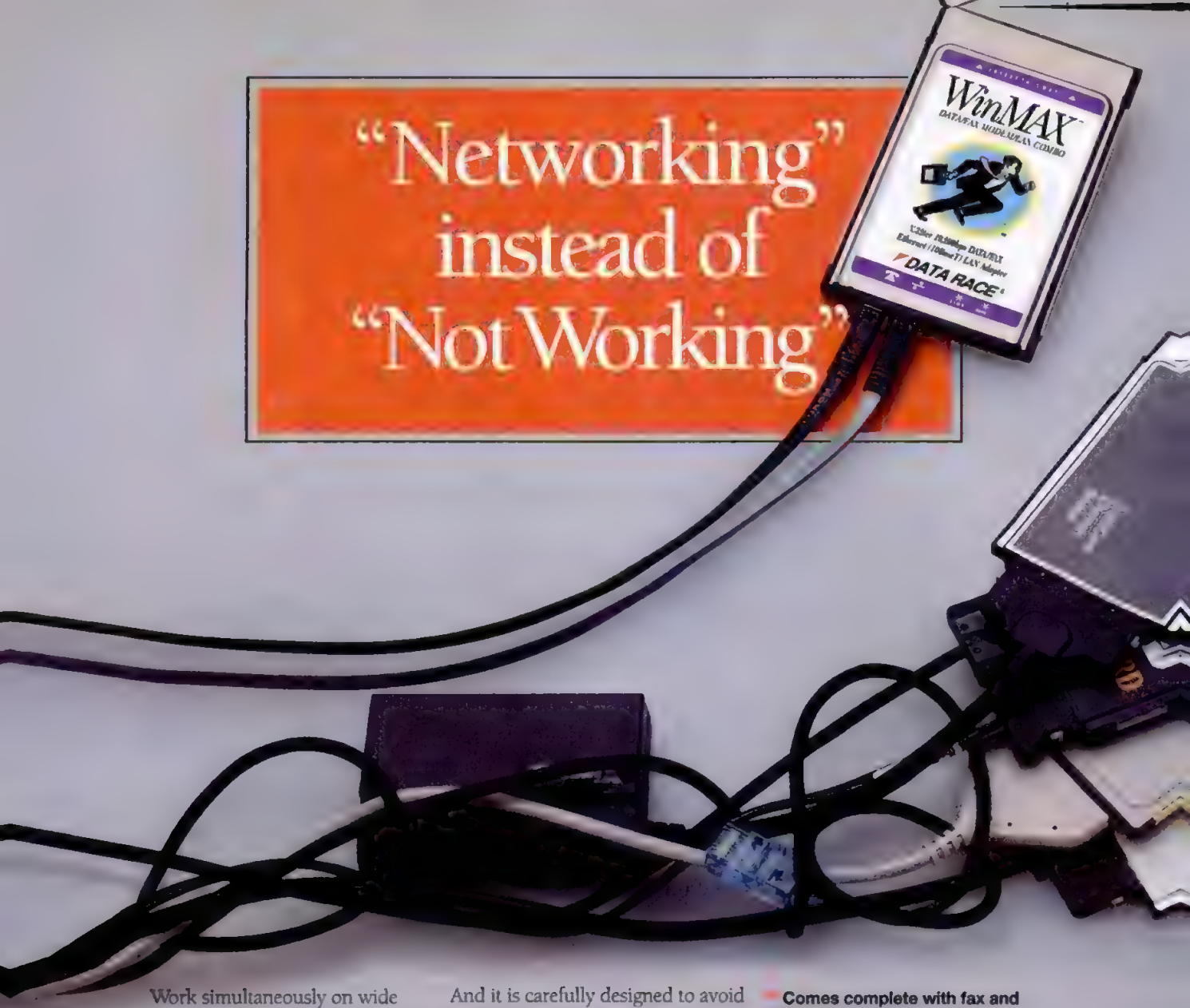
The Right Choice In Ethernet Switching.

Find additional product information on the Web at URL:http://www.plaintree.on.ca/plaintree

© 1995 Plaintree Systems. Plaintree Systems is a registered trademark and WaveSwitch 100 is a trademark of Plaintree Systems, Inc.

CIRCLE 899 ON READER SERVICE CARD

"Networking" instead of "Not Working"



Work simultaneously on wide and local area networks! Don't tolerate slow responses or switch back and forth between networks when communicating from your notebook PC.

The WinMAX Combo Card is an Ethernet LAN adapter and a 19.2Kbps modem. Designed exclusively for Windows, it harnesses the power of the PC's processor and memory to race more data over the network.

And it is carefully designed to avoid interrupt conflicts with other Windows programs you may be running at the same time.

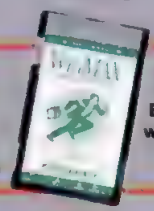
WinMAX comes complete with fax and data communications software. The instructions include pictures displayed on your screen for quick and easy installation. There are no extra adapters. You simply plug in the cords, load and go!

With WinMAX, you're not just working—you're networking.

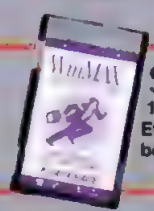
- **Comes complete with fax and data communications software, ODI (Novell) and NDIS (Microsoft and others) LAN drivers**
- **WinMAX LAN card extensively tested for Microsoft LAN MAN, Artisoft Lantastic, Banyan Vines, Performance Technology POWERLAN and Novell Netware**
- **30-day money-back guarantee, 5-year warranty and FREE technical support**
- **Lowest prices on the market because you order direct from manufacturer**

Call 1-800-759-4483

$129
19.2Kbps modem designed for Windows, includes fax and data communications software



$99
Ethernet LAN adapter with ODI and NDIS drivers



$249
19.2Kbps modem and Ethernet LAN adapter can be used simultaneously

VISA MasterCard DISCOVER

DATA RACE®
Connections for Computers™
11550 Interstate10 West, Suite 395 San Antonio, TX 78230

CIRCLE 651 ON READER SERVICE CARD

M17

UNINTERRUPTIBLE POWER SUPPLY

HP Enters the UPS Market

By Steve Buehler

Hewlett-Packard's name has long been associated with quality; LaserJet printers, Vectra desktop PCs, and NetServer servers from HP have all been recent *PC Magazine* Editors' Choice winners. Now HP is moving into the uninterruptible power supply (UPS) market with its new HP PowerWise line.

Only time will tell whether HP's presence in the UPS market will be as significant as it is in others. One thing is certain: The HP PowerWise is not going to revolutionize the UPS industry.

The PowerWise is available in two versions: a 1,000–volt-ampere model for a single server ($1,099) and a 2,100-va model for either two 486 servers or a minicomputer ($1,799). The PowerWise competes directly with APC's BackUPS and SmartUPS, but without APC's wide selection of power ranges and add-on products.

AIMING AT BUSINESS USERS

Targeted straight at the corporate and small-business markets, the PowerWise and its management software answer most of today's UPS and power management requirements. Together, the rack-mountable PowerWise and the HP PowerWise Power Management software offer line conditioning to eliminate spikes and surges, power backup in case of a utility-company failure, and the ability to add runtime modules. In addition to all that, you can plug SNMP management cards into your PowerWise.

Apart from providing tight management integration with the OpenView network management platform, however, the PowerWise does not break any price or feature barriers in the industry. Additionally, the first PowerWise models fill only a small part of a complete line of power management solutions. Pricing is steep; slightly more powerful units from APC list for $200 less. HP claims this is justified, because its use of on-line power technology (compared with APC's line-interactive technology) puts less strain on the server during power outages.

The PowerWise and PowerWise Power Management software support NetWare, Microsoft Windows NT, OS/2 LAN Server, LAN Manager, SCO Unix, HP-UX, AIX, Solaris, and UnixWare. PowerWise Assistant monitors load and run times, and the UPS offers a very short recharge time, which is important if your power goes out frequently and for extended periods of time.

HP PowerWise. *List price: With 1,000 va, $1,099; with 2,100 va, $1,799; external battery pack, $399; SNMP card (10Base-T), $499; SNMP card (10Base-T and ThinLAN), $699; HP Power Management Software, $99; rack-mount shelf, $149. Hewlett-Packard Co., 150 Green Pond Rd., Rockaway, NJ 07866; 800-533-1333; fax, 201-586-5800.*

Circle 968 on reader service card

THE NETWORKER By Diane Danielle

Help for Network Managers

When I give a seminar, I always ask the attendees if they have a CompuServe or Internet account. The percentage of people who now say yes has gone up, but I am amazed at how many still support networks without access to on-line resources. On such services you can find patches, fixes, technical information, shareware, and advice from others trying to solve similar problems. I never buy or install a new product or upgrade without checking on-line to see how things are going for those who've gone before.

In addition to the commercial services, many vendors have their own BBSs and fax-back services—some unfortunately with 900 numbers. Although fax-back services focus on sales literature and product specs, I encourage you to investigate your vendors' services.

It was during just such browsing that I discovered, to my delight, that Seagate's BBS carries diagrams and specs for all of its hard disks. Indeed, one of my criteria now when I buy hardware is the availability of complete specs on-line.

In addition to on-line services, and books of course, several CD-ROMs are worth a look. If you spend much time doing product research, consider Computer Select, from Computer Library. It has the past 12 months of articles on computer topics, hardware and software specs, and company profiles. But it isn't perfect. Although Select has the full text of articles from a variety of publications (including all of Ziff's), for many it includes only abstracts. It is also expensive ($1,250 per year for standalone). If you just want a fast way to wade through 6 months of computer publications to find that article you remember reading, it's less expensive to use CompuServe, where Select is available on ZiffNet at a surcharge.

Computer Library also offers two other CD-ROMs: Support on Site for Applications and Support on Site for Networks. These help you solve technical problems. The idea is good: You have a problem, you describe the symptoms, you locate a solution. The search engines, however, are weak.

Microsoft and Novell offer their own CD-ROMs. Microsoft's TechNet is $295 per year; Novell's NSEPRO is $1,395 per year (for CNEs, it's $767). Much of the information in NSEPRO is available on CompuServe or Novell's Web site, a potentially less expensive solution. Both CDs contain documentation, sales material, support information, technical documentation, patches, and fixes. The subscription includes monthly updates. These, too, are easier to browse than to search.

I'll state this as unequivocally as I can: If you support a network, get on-line! If your choice is CompuServe, get Tapcis or Ozcis to automate your on-line sessions. You'll save a lot of money. If you have a Microsoft shop, get TechNet. If you have a Novell shop, check out the CompuServe or Internet resources first. (My recommendation would be different if NSEPRO were less expensive.) Whatever you choose, it's a good idea to learn how to find the answers to different technical problems—before an emergency strikes and you're desperate for those answers.

Diane Danielle, an independent networking consultant, can be reached on CompuServe at 72241,2566 or MCI Mail at 383-1159.

Illustration by Gérard Dubois

IT'S THE SAME WITH TCP/IP FOR WINDOWS...

IF IT ISN'T SIMPLE TO USE, YOU'RE TOAST.

PC/TCP®
OnNet™
for DOS/Windows

THE WORLD'S MOST ADVANCED SUITE OF WINDOWS TCP/IP APPLICATIONS IS ALSO THE EASIEST TO USE.

PC/TCP® OnNet,™ an integrated suite of VxD-based, point-and-click software from the world's leading supplier of TCP/IP, is designed to keep your PC interconnectivity chores from becoming a circus. OnNet's built-in applications help you link mobile users, workgroups, or your entire global enterprise, hassle free.

SIMPLE TO INSTALL.

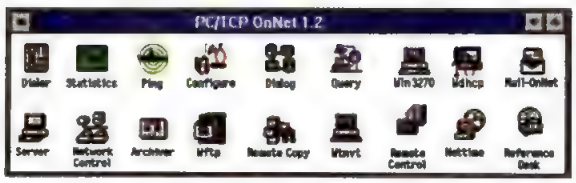
In five minutes, you're ready to go anywhere, thanks to our intuitive installation that recognizes existing network configurations. From a centralized server, you can quickly install OnNet across large networks, even from remote sites.

SIMPLE TO USE.

PC/TCP OnNet puts dozens of easy-to-use Windows applications at users' fingertips, from e-mail to file transfer to terminal emulation. Connect to the Internet from anywhere in the world with our advanced serial line Windows Dialer. And nobody offers more comprehensive technical support than FTP Software.

SIMPLE TO ADMINISTER.

Our DHCP server automatically assigns IP addresses and other configuration information.



GO ANY WHERE

It also keeps track of who is where, so you spend less time administering and more time being productive.

You can use OnNet today over Windows 3.1 or Windows for Workgroups. Plus, we're ready for Windows '95 — are you?

FREE! Evaluation Copy* CALL NOW!

1-800-282-4FTP, ext. 425
e-mail: info@ftp.com
WWW: http://www.ftp.com

ftp Software®
Opening Windows To Productivity.

FTP Software, 100 Brickstone Square, Andover, MA 01810 (508) 685-3300

PC/TCP is a registered trademark and OnNet is a trademark of FTP Software, Inc. Other tradenames, trademarks, or registered trademarks are the property of their respective holders

CIRCLE 861 ON READER SERVICE CARD

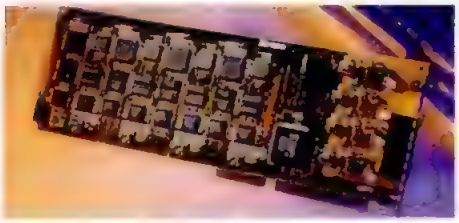
New & Improved

NEWS OF ANNOUNCED PRODUCTS AND UPGRADES

By Leslie Wygant

Xircom's Netaccess Keeps It All Inside

Attention, V.34 modem users: You don't need to worry about bulky external modems with the Netaccess Multiport Modem Card. **Xircom**'s initial offering in its Netaccess remote-access product line. The Multiport Modem, which works with NetWare Connect and Microsoft Windows NT Server, includes multiple V.34 modems on a single card. You can manage the card from an SNMP console and use Xircom's included diagnostic software.



NO MORE BULKY MODEMS: *Xircom puts the modem inside its Netaccess Multiport Modem Card.*

Netaccess Multiport Modem Card. *List price: For four ports, $3,499; for eight ports, $6,499. Xircom Inc., 2300 Corporate Center Dr., Thousand Oaks, CA 91320; 800-438-4526.*

Circle 957 on reader service card

DAX 3.0 Lets You Talk, Look, and Listen

Imagine developing integrated voice, fax, and modem applications that run with one command and can be used with a variety of third-party products. **Ram Research** makes this possible with DAX 3.0, its applications development software for integrated communications systems. In addition to the many boards DAX has worked with in the past, Version 3.0 adds support for Talking Technologies and Pika voice boards, Dialogic and Hayes fax boards, and AT-compatible modems. A version of DAX (called DUET) is available for the Macintosh.

DAX 3.0. *List price: DAX Developer's Edition for four phone lines, $595. Ram Research, 1920 Monument Blvd., #533, Concord, CA 94520; 510-603-1122; BBS, 510-603-1126.*

Circle 958 on reader service card

FastStack Offers a Family of Hubs

Do you want to migrate to high-speed technologies without rebuilding your entire network? You can bring 100 Mbps to your existing network with **NetWorth**'s FastStack integrated hub family. The FastStack products, which are scheduled to be available in June, include the FastPipes Ethernet switching hub, the 100Base-T FastStack hub, and the 10Base-T FastStack hub. Each offers a redundant power supply, RMON capabilities, and security. The FastPipes Ethernet switching hub includes six 10-Mbps ports and one modular 100-Mbps high-speed port that has FDDI, 100Base-TX, 100Base-T4, 100VG-AnyLAN, and ATM capabilities.

The 100-Mbps FastStack hub also offers Smart Uplink. This optional daughterboard makes migrating to 100 Mbps easier by letting you place a FastStack hub into any existing 10Base-T configuration without requiring you to change your cabling.

Other news: NetWorth plans to phase out its use of 10/100 boards from Intel and to introduce its own 10/100 adapters.

NetWorth FastStack family. *List price: FastPipes, $3,995 and up; 100Base-T FastStack, $1,995 and up; 10Base-T FastStack, $995 and up. NetWorth Inc., 8404 Esters Blvd., Irving, TX 75063; 800-544-5255.*

Circle 956 on reader service card

FAXserve 3.0 Offers Fax That You Can Count On

In addition to letting you send and receive faxes from your PC via DOS, Windows, e-mail, or other communications applications, **Cheyenne Software**'s FAXserve 3.0 offers runtime NetWare and NDS integration. Cheyenne's newest release of its fax solution sports a new GUI based on Cheyenne's BitWare program and includes Windows-based management software. Compatibility with other products has expanded to include fax boards from Brooktrout, Gammalink, and Intel.

FAXserve 3.0. *List price: $595 and up; free upgrades for those who purchased FAXserve 2.0 after February 14, 1995. Cheyenne Software Inc., 3 Expressway Plaza, Roslyn Heights, NY 11577; 800-243-9462.*

Circle 961 on reader service card

Go Everyware with ISDN Remote Access

For ISDN remote access to your enterprise network and the Internet, check out **Combinet**'s Everyware 2000 family of multiprotocol routers. These fully integrated solutions, which start at under $1,000, connect remote users to a LAN or the Internet at speeds of up to 512 Kbps via ISDN BRI (basic-rate interface). The

IT'S ALL THERE: *Combinet's Everyware 2000 routers offer you remote access.*

Everyware 2000 products include IP and IPX routing over PPP, SNMP management, security, and on-demand dialing.

Everyware 2000 SOHO. *List price: $999.* **Everyware 2000.** *List price: $1,299. Internal NT1 (for either router), $200. Combinet Inc., 333 El Camino Real, Sunnyvale, CA 94087; 800-967-6651.*

Circle 959 on reader service card

New & Improved

Communicate from Afar With Oracle Office 2.1

Communication is a key factor in business, and in today's mobile world methods of communication such as messaging and scheduling can make or break you. **Oracle** Office 2.1 boasts enterprise-wide client/server software for seamless, scalable communications among local and remote users. Office 2.1's client software lets users of both Windows and Macintosh systems communicate while away from the network. As far as scheduling, you can share your calendar with others and set up meetings. Office 2.1, which is built on Oracle7, works on over 25 platforms, including NetWare, VMS, and several flavors of Unix. It also lets you access the Internet and existing e-mail systems.

Oracle Office 2.1. *List price: $150 per user, with an eight-user minimum. Oracle Corp., 500 Oracle Pkwy., Box 659308, Redwood Shores, CA 94065; 800-633-0596; Web,* http://WWW.oracle.com/.

Circle 960 on reader service card

BRIEFS

SOFTWARE

In a joint effort, **Software Interfaces** (SI) and **Hewlett-Packard Co.** (HP) announce the integration of SI's ProReports, for client/server database warehouse reporting, with HP's Intelligent Warehouse. With ProReports, you can combine queries from a variety of databases into one report, giving you greater flexibility. The integration of these two products allows you to schedule to run a report on a server instead of using a client. This decreases your network load by freeing up the client to perform other tasks. You can also print large reports on heavy-duty printers attached to the server. ProReports starts at $695 for the client side and $10,000 for the server side. Software Interfaces, 713-492-0707. Hewlett-Packard Co., 800-637-7740

Get a Boost from LANbooster 5000

Switches provide a solution to improve busy, overworked networks. But choosing a switch isn't an easy task; you need to examine a product's flexibility, throughput, cost, and interoperability. **ONET Data Communication Technologies,** with a focus on throughput and flexibility, has announced the ONET LANbooster 5000 switching hub, which includes MetaSwitching, its ASIC (application-specific integrated circuit) nonblocking cell architecture to provide guaranteed throughput, fixed latency, and low-cost data transfer. ONET's complete family of Ethernet switches, including the LANbooster 5000, provides solutions for 10-, 20-, and 100-Mbps connections. ONET is scheduled to offer a FDDI-to-Ethernet/Full-Duplex Ethernet switching module for the LANbooster 5000 in June.

ONET LANbooster 5000. *List price: With 4 slots and 48 ports, $42,960. ONET Data Communication Technologies, 124 Mount Auburn St., Cambridge, MA 01238; 617-576-5759.*

Circle 962 on reader service card

WE'D LIKE TO EXPOSE YOU TO THE NEXT-GENERATION OF PC CLIENT/SERVER COMPUTING. FOR FREE. (SEE BOTTOMLINE FOR DETAILS.)

DOWNLOAD ORACLE WORKGROUP/2000 OFF THE INTERNET AND TRY IT FREE FOR 90 DAYS.

TeamTalk 2.0 for Talking Now and Later

Lots of times when you use your network for discussions, too many people contribute and the discussion turns chaotic and difficult to follow. **Trax Softworks** has added threaded discussions and user-access permissions to TeamTalk 2.0 to make it easier for you to organize conversations both in real time and historically. TeamTalk 2.0 also lets you keep a member list for each topic; members are notified when comments are added. You can choose to be notified of updates, perform searches, and insert graphics via OLE 2.0. Remote users can also access TeamTalk. You can use TeamTalk with Microsoft Windows 3.1, Microsoft Windows NT, and IBM's OS/2 operating systems.

TeamTalk 2.0. *List price: For five users, $395; for additional users, $61 to $79 per user; upgrades, $21 to $27 per user. Trax Softworks Inc., 5840 Uplander Way, Culver City, CA 90230-6620; 800-367-8729; e-mail,* info@traxsoft.com.

Circle 964 on reader service card

BRIEFS

SOFTWARE

If you want to share CD-ROM drives and multimedia applications on your network, take a look at **Reed Technology and Information Services'** (formerly Online Computer Systems) Opti-Net 4 ($795 for eight users) and Opti-Net NLM 4 ($1,495 for 100 users). Reed Technology and Information Services offers you an alternative to adding CD-ROM drives to each PC on your network. Opti-Net 4 works with Microsoft Windows and DOS and turns a networked PC into a CD-ROM optical server under IPX/SPX or a NetBIOS-compatible network. Opti-Net NLM 4, which also works with Windows and DOS, lets users share CD-ROM and multimedia applications on a NetWare file server. 800-922-9204.

Fiery for Color Printing

Electronics for Imaging (EFI) believes that two things have held back color printers from replacing black-and-white printers: speed and cost.

To lower costs and accelerate processing speeds, EFI developed the Fiery XJ family of color servers by combining hardware (Rip-Chips, to off-load functions from the main CPU) and software (Rip-While-Print, to print while processing, and Continuous Print, to eliminate delays between print jobs) onto one board.

HEAT IT UP: *You can manage color printing with EFI's Fiery XJ servers.*

EFI Fiery XJ170. *List price: $16,995.* **EFI Fiery XJ300.** *$32,995. Electronics for Imaging Inc., 2855 Campus Dr., San Mateo, CA 94403; 800-285-4565.*

Circle 963 on reader service card

Oracle Workgroup 2000™
Proof that you can.

Oracle Workgroup/2000 is the one thing you need to build a PC-based client/server system. With powerful and easy-to-use databases, middleware and tools, Oracle Workgroup/2000 makes building and installing applications easier than ever before.

To test drive Workgroup/2000, just log on. http://www.oracle.com/

But we're not asking you to take our word for it. We're ready to prove it. Log onto Oracle's Web page and download Oracle Workgroup/2000 for a free 90 day trial or register for our free seminar.

http://www.oracle.com/

If you can't access the Net, call 1-800-492-9870 ext. 4437 for a free CD ROM of Workgroup/2000.*

Oracle Workgroup/2000™ includes:

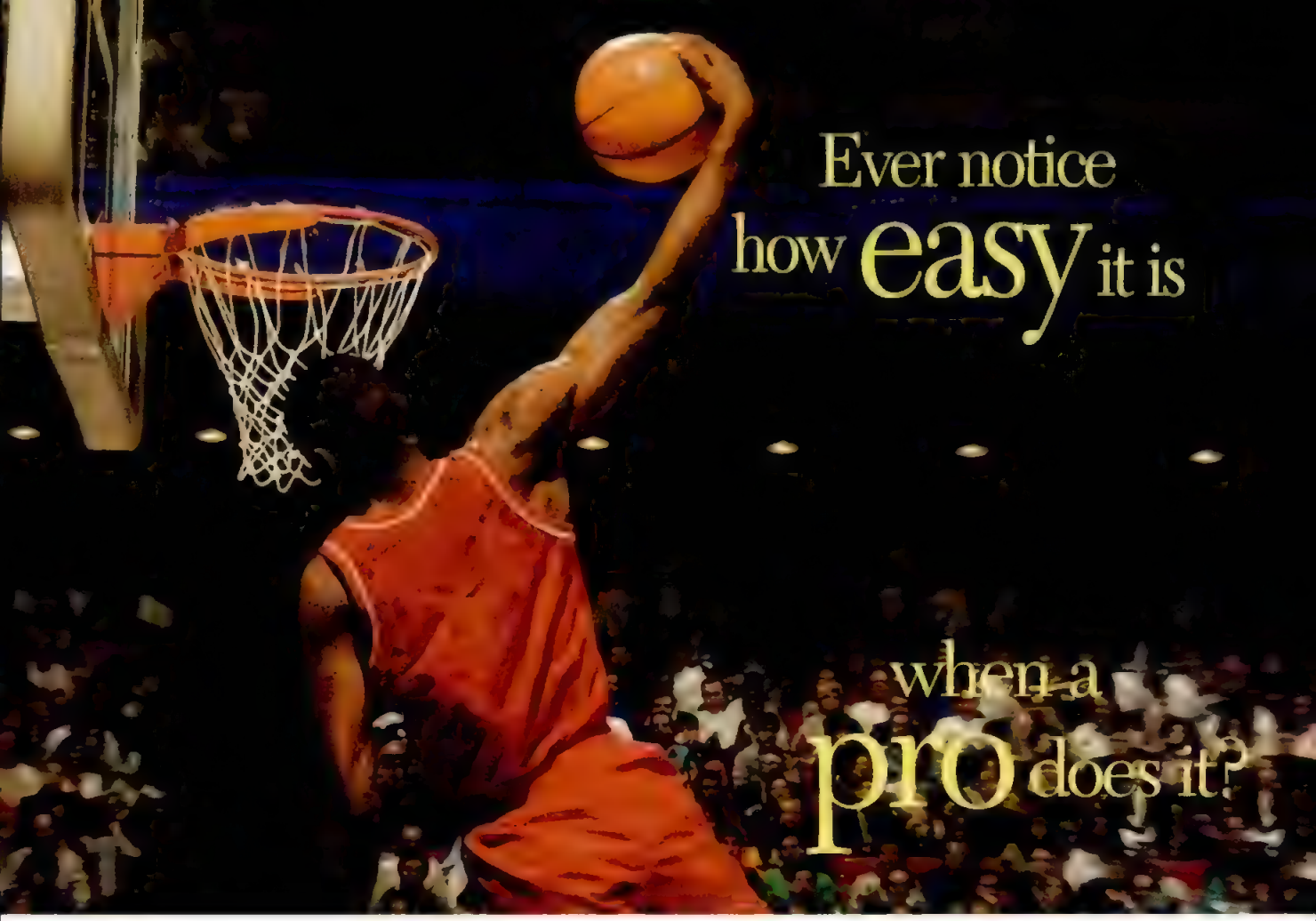
- Oracle7 Workgroup Server™
- Personal Oracle7™ for Windows
- Oracle Objects™ for OLE

And coming soon:

- Oracle Radio Agents™
- Oracle Power Objects™

ORACLE

©1995 Oracle Corporation. All rights reserved. Oracle is a registered trademark. Oracle7, Workgroup Server, Personal Oracle7, Oracle Objects, Radio Agents, Oracle Power Objects and Workgroup/2000 are trademarks of Oracle Corp
*Shipping and Handling not included



Ethernet doesn't have to be hard.

Not to use.

Not to install.

Not to pay for.

Easy to use Finding reliable Ethernet products at the right price is now a slam dunk. Introducing Proteon's new easy-to-use ProNET/E™ family of Ethernet products: Standards-based switches to improve the performance of your existing network and provide high speed connections to the backbone. Manageable and flexible hubs for your workgroup or enterprise network needs. And the best value in full-featured, high quality Ethernet adapters available. **Easy to install** Installation of all Proteon Ethernet products is a snap. Plus, reliability is guaranteed. The ProNET/E family is backed by the most aggressive warranties in the industry. **Easy to pay for** For the same price, or less, of the no-name brands, you can have the performance, dependability and interoperability of Proteon. What's more, combined with our award-winning Token Ring products, you now have one source for your networking needs. So call Proteon at **800-545-7464** or call your reseller to learn more. And soon you'll be showing the world how a pro does it.

Build your network more affordably, dependably and easily with ProNET/E switches, hubs and adapters.

proteon network with the pro™

© 1995 Proteon, Inc.

CIRCLE 929 ON READER SERVICE CARD

New & Improved

PC Watchdog Keeps A Lookout

Even if you need to keep your PC running 24 hours a day, you probably don't want to sit by and monitor it in case something goes wrong. You can still have a life with **Berkshire Products**' PC Watchdog. This system-monitoring board restarts malfunctioning PCs and notifies you of problems. A temperature gauge option is also available that trips an alarm if the PC heats up above 110 degrees Fahrenheit. Berkshire designed PC Watchdog with the following environments in mind: BBS services, file servers, voice mail systems, and industrial control.

PC Watchdog. *List price: Without temperature monitoring, $144.95; with temperature monitoring, $159.95. Berkshire Products, 2180 Pleasant Hill Rd., Suite A-5185, Duluth, GA 30136; 404-271-0088.*

Circle 966 on reader service card

BRIEFS

ANNOUNCEMENTS

Efforts to protect network data from disasters lag far behind the increased growth of and reliance on LANs, according to **Comdisco** and **Palindrome**'s 1995 Vulnerability Index. Comdisco and Palindrome interviewed 300 of the biggest U.S. computer companies and found that companies need backup and off-site data-storage procedures to allow business to proceed even after a disaster occurs. According to the Index, financial services companies are best prepared for network disruption. To receive a copy of the 1995 Vulnerability Index findings or a Vulnerability Index self-assessment, call 800-272-9792.

LAN Inventory Tracks Your LAN Assets

Keeping track of hardware and software on your network isn't an easy task, and inventory applications are a welcome sight for network administrators. **McAfee Associates** has announced LAN Inventory 3.2, which works with Compaq's Intelligent Manageability Strategy for simplified LAN-asset management. LAN Inventory 3.2 runs on NetWare 3.*x* and 4.*x* local area networks and recognizes flawed Intel Pentium chips.

LAN Inventory 3.2. *List price: For two-year subscription (including free updates and support), $10 per node for 50 nodes to $8 per node for 1,000 nodes; upgrades for current LAN Inventory customers are free. McAfee Associates Inc., 2710 Walsh Ave., Santa Clara, CA 95051-0963; 800-866-6585; 408-988-3832.*

Circle 965 on reader service card

MULTIPLE ACCESS By Frank Derfler

OS/2 Warp Connect

I don't understand the high emotion behind the anti-Microsoft movement. I'm suspicious of the motives behind the Microsoft flaming, because I think companies should compete by fielding better technology and better marketing instead of through judicial, regulatory, or emotional maneuvering.

Fortunately for the industry, Microsoft will face some dandy technical competition in the networking arena in the second half of 1995. Those who rely on networks for a living can test new interoperable and economical LAN options on their own desktops before football starts again.

We've filled the pages of this issue with the good and bad about Windows 95—including its networking prowess. But don't think that Microsoft is the only one offering networking flexibility, interoperability, and style. IBM's OS/2 Warp Connect (OS/2 Warp with lots of networking built-in) is scheduled to hit the streets before Windows 95. Several members of the *PC Magazine* Network Edition team are running the Warp Connect beta and we like it.

So go slowly with your Windows 95 plans. I think every network manager in the world should run a test-bed of both Windows 95 and OS/2 Warp Connect for a while. It's not a big hardware investment, and you'll know a lot more when you let them go head-to-head right on your desktop.

What does OS/2 Warp Connect do for networking? Darn near everything! For starters, it comes on four CD-ROMs—they didn't leave much out. One service, IBM Peer for OS/2, gives you client and server capabilities that interoperate with other Warp Connect, IBM OS/2 LAN Server, Windows for Workgroups, and Windows NT clients and servers. The mind boggles at the permutations. There's also a service called NetWare Client for OS/2 (they haven't mentioned a server for NetWare clients yet). IBM's TCP/IP stack for OS/2, shipped with an Internet Access Kit, handles communications with the rest of the world.

The networking utilities in OS/2 Warp Connect include Network SignOn Coordinator, a help database, and LAN Distance Remote. SignOn holds all your log-on names and passwords and sends them out to the various services. The help database does word searches of FAQs, setup guides, and descriptions of known problems. LAN Distance Remote is a client for a LAN Distance Server and works through a modem to another Warp Connect package.

The buzzword for the second half of '95 is flexibility, but that comes at a price. I'm no fan of networks running multiple protocols, because I've found that increases your problems and costs exponentially, but both OS/2 Warp Connect and Windows 95 make it easy to turn on IP, IPX, and NetBIOS at the same time. Once you launch the software for these protocols, routing, security, and management is up to you. I prefer solutions like Performance Technology's Instant Internet that keep a solid firewall between different protocol worlds, but the new OSs provide the capability to shape the network any way you want.

If you don't want to change your entire OS to get networking flexibility, remember that PowerLAN and LANtastic are each excellent client programs for servers running Microsoft networking software or NetWare. □

Illustration by Mark Macho

.....Play to win and save yourself some money.....

SAVE UP TO 47%

Make the ultimate move for serious gamers who know the score when it comes to buying computer gaming magazines. Subscribe to Computer Gaming World now and save up to 47%!

Every monthly issue brings you exclusive first looks at the hottest, newest games... the latest in multimedia, CD-ROM and interactive environments. Plus winning strategies, master clues, in-depth reviews – all the help you need to pump up your system and play out your fantasies on this planet and beyond.

Score points and cosmic savings now with Computer Gaming World. We're worlds apart from any other computer game magazine.

- One year/12 issues – $27.94. YOU SAVE 41%!
- Two years/24 issues – $49.97. YOU SAVE 47%!

Savings based on annual cover price of $47.40.

CALL NOW TO SAVE UP TO 47%

1-800-827-4450

To ensure savings, mention this code to the operator who answers your call: 4Z95.

Your Golden Gateway to Windows 95.
NEW BW-Connect NFS for DOS and Windows.

"Hey Fred, it says here you can get the Windows 95 version for free!"*

Buy BW-Connect™ NFS v3.2 now and we'll upgrade you to the Windows 95™ version absolutely free!* New version 3.2 includes the first commercial WWW server for Windows®, slick new Internet access tools, and over 40 Windows applications in all.

- Full suite of Winsock client tools including FTP, telnet, a threaded news client, gopher and much more.
- High performance NFS client.
- Quick and easy installation.
- Largest suite of Inetd-based server tools including FTP, telnet, lpd, gopher, bootp and many others.
- E-mail with MIME attachments, MAPI interface, 100,000 word spell checker.
- Supports DHCP client and BOOTP client and server for easy, central ized TCP/IP administration.
- Personal Internet Publishing with WWW and gopher servers.
- Factory direct!
- $349 per user! (Substantial quantity discounts available).

BW-Connect NFS for DOS and Windows is your migration path to Windows 95. So get on the road to open connectivity today. Like Carl says, "When using the Web to cruise the Internet, it's a wide world out there."

Order your FREE 30-day evaluation of BW-Connect today:

1-800-651-9076

COME SEE US AT COMDEX, BOOTH #N6264

Let's Connect!℠

Beame & Whiteside Software™

yes It runs with NetWare

Finalist Best of Comdex Winner New NFS Server for DOS & Windows

Microsoft SOLUTION PROVIDER Partner

InteropNet Connection

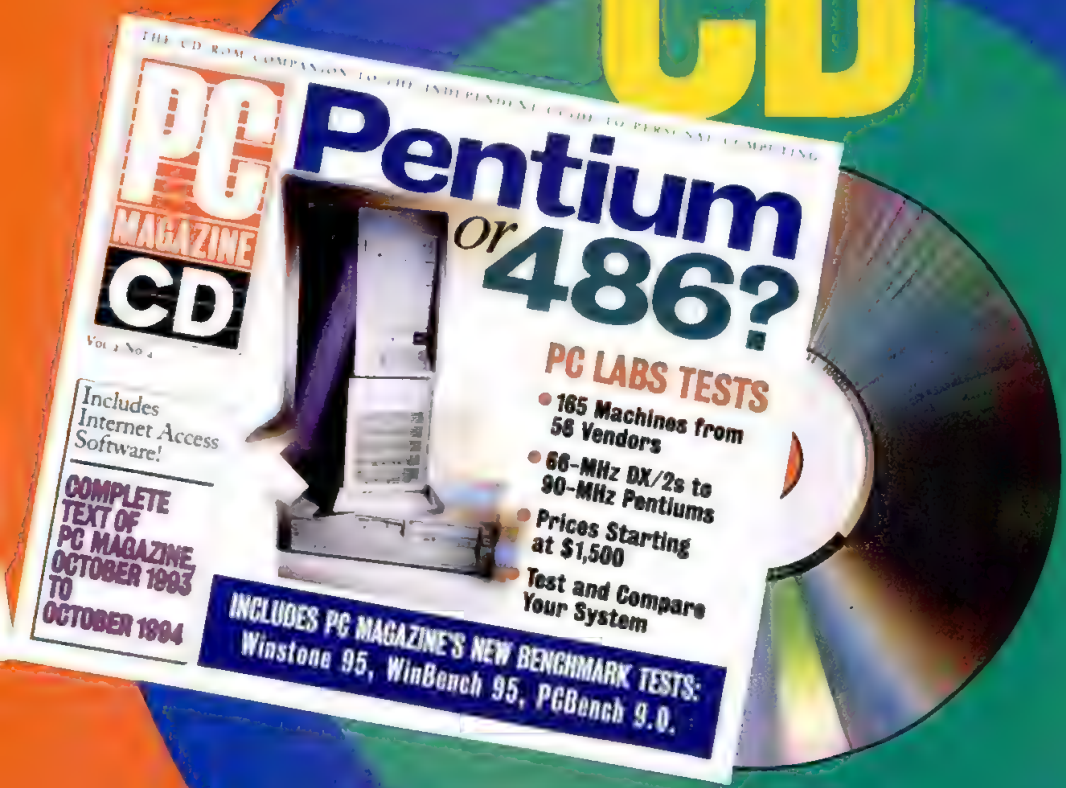
Data Comm Tester's Choice Best Advanced Package Windows

*Provided user is under Beame & Whiteside Technical Support ("Support Services") contract at the time of the release. **Developer tested only. Novell makes no warranties with respect to this product. All trademarks are the property of their respective owners. Beame & Whiteside Software, Inc. 706 Hillsborough St., Raleigh, NC 27603, Tel: (919) 831-8989, Fax: (919) 831-8990. ©1995 Beame & Whiteside Software, Inc. 155

CIRCLE 873 ON READER SERVICE CARD

INTRODUCING THE CD-ROM THAT PUTS A WHOLE NEW SPIN ON YOUR PC:

PC MAGAZINE CD



YOU'VE NEVER SEEN ANYTHING LIKE IT!

It's one thing to read about cutting-edge technology. It's another thing to plug right into it. Interact with it. Download it onto your system and play with it. That's exactly what PC MAGAZINE CD lets you do — and more.

Just one click and this interactive companion will let you:

- Walk through multimedia ScreenDemos that bring our Cover Stories to life. Hear and see the pros and cons of the entire competitive line-up right before your eyes.
- Put your system through its paces. Download PC Bench 9.0, WinBench 95 and Winstone 95 to chart and compare every aspect of your PC's performance.
- Get working samples of real applications to run on your system. You can even take a "First Look" at products before they hit the market.
- Access the full text of every article that appeared in PC Magazine in the past 12 months — including every utility, file, tip, shortcut and patch we've published. Dynamic "Super Searching" software lets you find what you need instantly.

PC MAGAZINE CD is a powerful tool that enhances the help you get from PC Magazine. Join us as a Charter Subscriber to PC MAGAZINE CD today.

FOUR POWER-PACKED QUARTERLY RELEASES JUST $49.95. Save 30% off the single-disc price!

CALL TO ORDER NOW! 1-800-335-1195 SUPPLIES ARE LIMITED

Mention Priority Code: 4M07

Toll free number is available in the United States and Canada. Other countries, call 303-604-1464 or FAX your order to 303-604-7455.
SYSTEM REQUIREMENTS: 386 or higher PC-compatible system, Windows™ 3.1, 6MB RAM, CD-ROM drive. Windows-compatible sound board recommended for some functions.
PC Magazine CD is $72 in Canada (includes Canadian GST and shipping charges); $99 for all other foreign orders (includes air mail charges). The U. S. single copy price of PC MAGAZINE CD is $17.95.

PC MAGAZINE CD • P.O. Box 59494 • Boulder, CO 80322-9494

L.C. NEWSTIME CD • [illegible] • BOULDER, CO 80328-2484

4 Unreliable Applications Servers.
28 Unhappy Users.
And You Haven't Seen Your Kids in a Week...

You Need the Manageability, Flexibility and Pentium Performance of ChatExpress™

Running a typical department full of applications servers can be nerve-wracking. Systems failures and other tough problems constantly plague you. Hardware that's difficult to upgrade can limit your flexibility. Servers with single points of failure, like power supplies, can leave your users screaming!

Relax! The solution is at hand with ChatExpress from J&L, the industry's leading, rack-mounted high performance applications server. ChatExpress employs Pentium technology in the most manageable way possible. You can monitor and supervise ChatExpress Pentiums from your desk, anywhere on the LAN/WAN via SNMP. You can even do it from your home and avoid those eleventh hour midnight sessions! And you get the most reliable environment possible with J&L's unique Hot Swappable processors and Hot Swappable, fully redundant power supplies. Never has so much applications power been available in such a compact and manageable design.

To find out how we can put your network and your life back on track, call J&L at

(818) 709-1778 or Fax (818) 882-9134

intel inside

pentium PROCESSOR

J&L's Award-Winning Family of Application Servers

J&L Information Systems
9600 Topanga Canyon Blvd.
Chatsworth, CA 91311

The Intel Inside Logo is a registered trademark of Intel Corporation.
All other trademarks are registered trademarks of their respective companies.

CIRCLE 876 ON READER SERVICE CARD

UNITE YOUR TEAM AROUND THE WORLD. *It's amazing how productive a team can be — if you just connect them. PathWay Access 4.2 does just that — enabling teams, committees and workgroups to share information and ideas.*

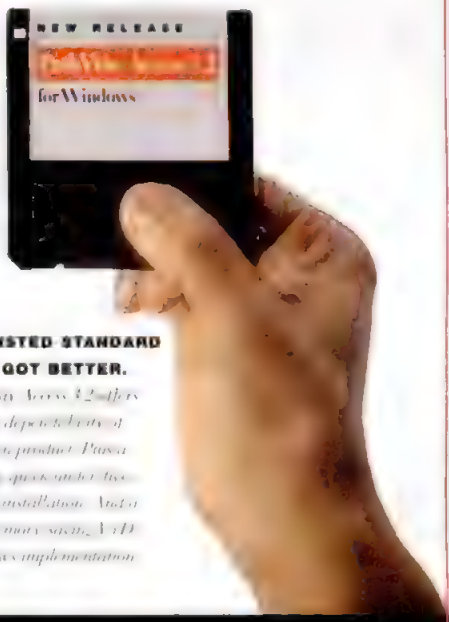
GET TO THAT MAINFRAME DATA IN DALLAS. *Or Des Moines, for that matter. Regardless of where it is in the enterprise, your data can be accessed with PathWay Access, private. From the desktop. All with the click of a mouse.*

Go anywhere on your net. Just click.

PRINT TO THE PRINTER NEAR THE COFFEE ROOM. *Or any printer on the network. With PathWay Access, you can use the printer that's most convenient to your next activity — whether that be your next meeting or your next banged shin.*

SEND MAIL ACROSS THE GLOBE. *Who want on snail mail? Or even speedy FedEx? Especially when you consider it you use PathWay Access, you can get the jokedone sent e-mail over the Internet — instantly.*

WORK IN THE COMFORT OF YOUR DEN. *Or hotel room. Or anywhere in between. With our remote access capabilities, you'll never miss a beat. You can access your corporate network and the Internet as easily as if you were in your office.*



GET FILES ON BOB'S PC. *Even though he's two buildings away. With PathWay Access and a few clicks of the mouse — you can access Bob's hard drive from your desk.*

A TRUSTED STANDARD JUST GOT BETTER. *PathWay Access 4.2 offers you the dependability of a proven product. Passes blazing speeds under last-minute installation. And in new memory saving, Vx/D Windows implementation.*

Lotus, The Word Group, Inc. All rights reserved. All product names are trademarks of their respective owners. WOL500 (R) 1/95

A SUITE OF KILLER TCP/IP APPS FOR DOS AND WINDOWS

PathWay Access

WOLLONGONG

Call 1-800-872-8649, ext. 23 for a free demo disk

You can also reach us in these ways: Email: pcsales@twg.com FAX: (415) 962-0286 In Canada: (519) 747-9600 On the WWW: http://www.twg.com

Connect with the Best.

Your guide to products and services.

The following companies are offering exciting new networking and communications solutions. Call them directly for more information, or call the dealer nearest you.

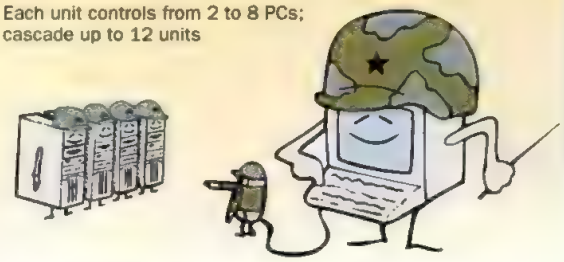
PC MAGAZINE NETWORK EDITION

WHO TO CALL:	SEE AD ON PAGE:	DIAL IN AT:
adaptec	NE15	800-934-2766
ASANTÉ ALL THE RIGHT CONNECTIONS	NE16	800-622-9686
AT&T Global Business Communications Systems	NE18	800-325-7466 EXT. 485
Beame & Whiteside Software	NE35	800-651-9076
DATA RACE Connections for Computers	NE26	800-759-4483
ftp Software	NE28	800-863-4548
intel	NE11	
Microsoft	NE12-13	
NEC	NE22-23	800-NEC-INFO
NETMANAGE	NE7	408-973-7171
NOVELL	NE2-3	800-BUY NOVL
Oracle Workgroup 2000	NE30-31	800-633-0518
PERFORMANCE TECHNOLOGY	NE42	800-784-4638
PLAINTREE SYSTEMS	NE25	800-YES-30DAYS
proteon network with the pro	NE32	800-545-7464
SMC SWITCH ON THE POWER	NE5	800-SMC 4YOU EXT.31
WOLLONGONG	NE38	800-872-8649

AutoBoot Commander™

Control up to 96 file servers with just 1 keyboard, monitor and mouse!

- Supports all 100% IBM compatible computers
- New KeyScanTM feature for keyboard-controlled scanning
- Jumperless support for analog (VGA) and TTL video
- Add a second control center up to 150 feet away
- AutoBootTM feature boots computers without operator intervention
- Each unit controls from 2 to 8 PCs; cascade up to 12 units



For Macintosh support, ask about our new Mediator™ for Macintosh!

Cybex Corporation
4912 Research Drive • Huntsville, AL 35805 USA
(205) 430-4000 • FAX (205) 430-4030

CYBEX™

IBM is a trademark of IBM Corporation. Macintosh is a trademark of Apple Computer, Inc.
Dealer Program Available **Made in USA**

CIRCLE 820 ON READER SERVICE CARD

CONTROL ALL YOUR PC SERVERS

FROM ONE KEYBOARD, MONITOR AND MOUSE
with *MasterConsole*®

COMPARE QUALITY AND PRICE PERFORMANCE

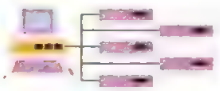
NEW! Hot-Key Commands

- Save Space, Cut Costs & Centralize Control With 100% Reliability
- "Plug and Play" Any mix of PCs & All Video
- Desktop or Rack Mount Models for 2,4,8,16 PCs . Expand to 64
- Keyboard & Mouse Emulation Insures Error Free PC Autoboot and PC Operation
- AUTOSCAN™ to Monitor All PCs

FREE!

CALL TODAY!
(908) 874-4072
Ext. 44
For our information kit!

SEE US AT COMDEX SPRING '95
BOOTH #N6567



RCI®

30-DAY MONEY BACK GUARANTEE **FULL 1-YEAR WARRANTY**

RARITAN COMPUTER, INC. 10-1 Ilene Court, Belle Mead, NJ 08502 FAX (908) 874-5274

INTERNATIONAL: France: (33) 1-64 67 64 67 Germany: (49) 180 522-8222 Ireland: (353) 1-454-0589 Italy: (39) 2-66800548 Japan: (81) 3-3255-1517 Korea: (82) 2-412-5775 Netherlands: (31) 10-4423313 Sweden: (46) 020-788850 Switzerland: (41) 22-7532200 Taiwan: (886) 2-218-1117 United Kingdom: (44) 244-520222 or (44) 344-424-333

INTERNATIONAL RESELLERS INQUIRIES WELCOME – CONTACT RCI (908) 874-4072

CIRCLE 822 ON READER SERVICE CARD

MAKE THE SWITCH!

Manage your entire computer system...from just one keyboard!

The Apex DeskTop Concentrator allows you to access & control up to 64 systems from single keyboard, monitor & mouse.

Make the call: 1-800-861-5858

APEX

Apex PC Solutions, Inc. 4580 150th Ave. NE Redmond, WA 98052
(206) 861-5858 Fax: (206) 861-5757

STARTING AT **$34** PER PORT

NO OTHER HUB STACKS UP!

PC MAGAZINE Editors' Choice 1994

- Next-Day Delivery
- Plug and Play
- Ethernet and Token Ring
- Network Managed

30-DAY FREE TRIAL

1-800-342-3768

P.O.

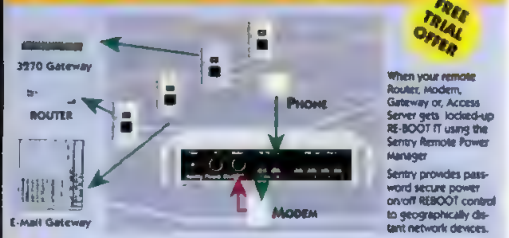
ISO9001

ADC Fibermux

CIRCLE 823 ON READER SERVICE CARD

RE-BOOT

Call for Info or a FREE DEMO DISK
800/835-1515 U.S.
408/745-0300
Fax 408-745-0392



FREE TRIAL OFFER

When your remote Router, Modem, Gateway or, Access Server gets locked-up RE-BOOT IT using the Sentry Remote Power Manager

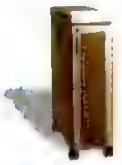
Sentry provides password secure power on/off REBOOT control to geographically distant network devices.

Using an ANSI emulator, a network administrator, calls the sentry, enters a password and receives an on screen menu From the menu individual ports can be toggled "power-off" or power-on" to re-boot locked-up mission critical network devices The Sentry supports 4 companion power modules which control the AC power flow to each network device

SERVER TECHNOLOGY 1288 Hammerwood Ave., Sunnyvale, CA 94089

CIRCLE 821 ON READER SERVICE CARD

LANPRO XPRESS SERVER



THE RELIABLE REDUNDANT SERVER

- Supports i486 DX2 66Mhz, Pentium 60/66/90Mhz
- Supports Dual Pentium Processors
- Multiple Architecture EISA/VLB or EISA/PCI
- Performance up to 180 mips
- ECC Memory
- 16Mb to 384Mb of memory
- Redundant SCSI Array featuring online "Hot-Swap" & "Hot-Spare"
- Chassis with direct air flow design
- 12 front accessible drive bays
- RPS with "Hot Swap" & "Hot-Spare"

intel inside

VALUELINE VLB & PCI

VALUELINE NETWORK READY PCs

- i486 SX25, DX33, DX2/66 MHz processors Pentium 60, 66, 90 MHz processors
- 256 KB L2 write back cache
- S3 Video Controller Superior Graphics Performance
- PCI or VESA local bus architecture Enhanced IDE or Fast SCSI support
- High speed serial ports
- Bi-directional parallel port
- NE2000 Combo

One year on-site service.

LAN Professionals Networking System, Inc.

Approved intel Business Partner · Channel Partner · yes Network Integrated Approved

800/454-9999 • FAX: 214/458-9836

CIRCLE 824 ON READER SERVICE CARD

BW-BOOTP™ Boot PROM

Improves Network Security and Administration.

- ✓ Create and maintain one set of network parameters at a central server.
- ✓ Provides virus protection and secure central control over file access.
- ✓ Available for over 90% of the Ethernet and Token Ring cards on the market.
- ✓ ROM Code on PROMs can be easily upgraded from the server.
- ✓ Extensive support utilities available.
- ✓ Multicast TFTP support.
- ✓ Boots network software from Novell, Sun, FTP, Beame & Whiteside and others.
- ✓ Large image 2.88 MB support.
- ✓ DHCP support.
- ✓ Just $79 per workstation with substantial quantity discounts available.
- ✓ Get your free evaluation kit today. Just call:

1-800-463-6637

Let's Connect!℠

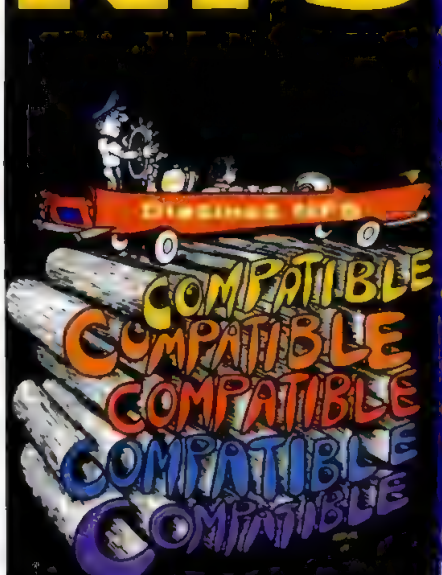
Beame & Whiteside Software™

Trademarks are the property of their respective owners. Tel: 919-831-0689 Fax: 919-831-8990 ©1995 Beame & Whiteside Software, Inc. 1237

CIRCLE 826 ON READER SERVICE CARD

Distinct NFS

Runs over Distinct® TCP/IP, Microsoft® TCP/IP and Novell® LAN Workplace



- Allows files and printer sharing across multiple platforms
- Works in Windows™, Windows for Workgroups and DOS boxes
- Implemented as a VxD
- Client and server
- Includes Windows Sockets

distinct

Email:mktg@distinct.com
Fastfacts: 408.366.2101
Fax: 408.366.0153
Phone: 408.366.8933

CIRCLE 825 ON READER SERVICE CARD

Schedule your next group meeting with

OnTime®

Real Time Group Scheduling

Now *you* can try the leading group scheduling application at no charge or obligation. Let us rush you an evaluation copy of *OnTime for Networks* absolutely free. Save yourself time and aggravation and save your company big $$$ by scheduling *your* next meeting with OnTime!

Call toll-free:

1-800-982-0094

Campbell Services, Inc • 21700 Northwestern Hwy • 10th Floor • Southfield • MI 48075

CIRCLE 827 ON READER SERVICE CARD

INSTANT INTERNET™

Link NetWare To The Internet In Under 1 Hour*

Connect All Your Users
Effortlessly connect all your NetWare or POWERLan Windows users to the Internet in one fell swoop. Each user is provided a WWW browser, email, and can run other WINSOCK-standard Internet apps too!

No-Hassle Installation
Just plug in the Instant Internet box and install in minutes while the network is up! No need for protocol changes, no need to reconfigure clients, no need to touch the server—no need to worry!

Built by LAN Experts
1995 marks Performance Technology's 10th anniversary as a vendor of award-winning networking products: POWERLan, POWERsave, and POWERfusion. Instant Internet inherits the legacy.

Instantly A Sweet Deal
Instant Internet also provides a security firewall, is high performing, and is licensed for your entire LAN—bundled apps too! And if you don't have a LAN? No problem. Ask about the "Instant Deal."

(800)PT-IINET
(800)784-4638
email: info@instant.net
home page: www.perftech.com

PERFORMANCE TECHNOLOGY

* Must have an Internet connection through a recognized service provider

CIRCLE 867 ON READER SERVICE CARD

Network Edition Advertisers Index

Reader Service No.	Advertiser	Page
874	3 Com Corporation	186-187
934	Adaptec	NE15
902	Asante Technologies	NE16
915	AT&T	NE18
873	Beame & Whiteside	NE35
913	C E Software	NE9
851	DataRace, Inc	NE26
935	Datastorm Technologies	252
912	Delrina Technology	NE21
861	FTP Software Inc	NE 28
*	Intel Corporation	NE11
876	J & L Information Systems	NE37
855	Micro Solutions Computer Products	326
862	Microcom	229
*	Microsoft	NE12-NE13
908	NEC Technologies	NE22-NE23
877	NetManage, Inc.	NE7
*	Novel, Inc	NE2-NE3
*	Oracle Corp	NE30-NE31
867	Performance Technology	NE42
899	Plaintree Systems	NE25
929	Proteon Inc	NE32
909	Standard Microsystems Corporation	NE5
911	Symantec Corporation	169
906	Symantec Corporation	285
864	Wollongong Group	NE38
942	Xerox Corporation	240
916	Xerox Corporation	282

*No Reader Service #. Please Call Advertister For Information.

FOR QUICKER RESPONSE
FAX TO
(609) 428-0882

FREE NETWORK PRODUCT INFORMATION

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 433 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

PC MAGAZINE NETWORK EDITION

P.O. BOX 11804
RIVERTON, NJ 08076-9404

Welcome. . . to the Network Section!

Circle the numbers below corresponding to products featured in the Network Section only. Use reader service card in the back of book to obtain information on other products. Fill in your name and address and answer the questions below. Manufacturers will mail FREE product literature to you.

Void after September 30, 1995

FREE NETWORK PRODUCT INFORMATION REPLY CARD

820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849
850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879
880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909
910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939
940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969
970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999

1. Do you work in a DP/MIS dept.?
01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity: (Check one)
01. ☐ Manufacturer Computer Equip., Computers, Software
02. ☐ Manufacturer–Aerospace
03. ☐ Manufacturer–Other
04. ☐ Systems House
05. ☐ Computer Consultant
06. ☐ Computer Retailer/VAR/VAD Distributor
07. ☐ Communications
08. ☐ Finance/Banking/Insurance/Real Estate/Accounting
09. ☐ Education
10. ☐ Government
11. ☐ Government Non-Federal
12. ☐ Research and Development
13. ☐ Data Processing/Computer Service
14. ☐ Health/Medical/Legal Service
15. ☐ Engineering/Architecture
16. ☐ Agr./Const./Mining/Oil/Transp./Utilities
17. ☐ Non-Computer Retailer/Dist.
18. ☐ Other Business or Service

3. Please indicate your primary business function: (Check one)
01. ☐ DP/MIS
02. ☐ Systems, Programming
03. ☐ Communications
04. ☐ Engineering
05. ☐ Res./Dev./Scientific
06. ☐ Accounting/Finance
07. ☐ Computer Consulting
08. ☐ Purchasing
09. ☐ Operations
10. ☐ Production
11. ☐ Education/Training
12. ☐ Marketing/Sales
13. ☐ Medical/Legal
14. ☐ Admin./Mgmt.

4. Is your company a reseller?
01. ☐ Yes 02. ☐ No

5. For how many nodes do you specify brands of networking products?
01. ☐ 10 or less 03. ☐ 26–99
02. ☐ 11–25 04. ☐ 100 or more

6. Do you plan to buy any network products:
01 ☐ Now 03 ☐ in 7–12 mos.
02 ☐ in 4–6 mos. 04 ☐ no plans

7. Please indicate the connections currently installed or planned for installation within the next 12 months at your current business location.

Installed	Planned
01 ☐ LAN to LAN	04 ☐ LAN to LAN
02. ☐ LAN to Host	05. ☐ LAN to Host
03. ☐ LAN to WAN	06. ☐ LAN to WAN

8. Number of employees in your entire company and at the site where you work:

Entire Company	At This Location
01. ☐ 25 or less	01 ☐ 25 or less
02. ☐ 26–99	02. ☐ 26–99
03. ☐ 100–499	03. ☐ 100–499
04 ☐ 500–999	04 ☐ 500–999
05. ☐ 1000 or more	05. ☐ 1000 or more

PC 5/16-

Name

Title | Telephone

Company Name

Address

City | State | Zip

5 ☐ Please send me a one-year (22-issue) subscription to PC Magazine for $34.97 (U.S. price); all other countries add $36.00 for additional postage

Welcome. . . to the Network Section!

Circle the numbers below corresponding to products featured in the Network Section only. Use reader service card in the back of book to obtain information on other products. Fill in your name and address and answer the questions below. Manufacturers will mail FREE product literature to you.

Void after September 30, 1995

609-829-0692

FREE NETWORK PRODUCT INFORMATION REPLY CARD

820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849
850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879
880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909
910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939
940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969
970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999

1. Do you work in a DP/MIS dept.?
01. ☐ Yes 02. ☐ No

2. Please indicate your company or organization's primary business activity: (Check one)
01 ☐ Manufacturer Computer Equip., Computers, Software
02 ☐ Manufacturer–Aerospace
03 ☐ Manufacturer–Other
04 ☐ Systems House
05. ☐ Computer Consultant
06. ☐ Computer Retailer/VAR/VAD Distributor
07 ☐ Communications
08. ☐ Finance/Banking/Insurance/ Real Estate/Accounting
09. ☐ Education
10. ☐ Government
11 ☐ Government Non-Federal
12 ☐ Research and Development
13. ☐ Data Processing/Computer Service
14. ☐ Health/Medical/Legal Service
15. ☐ Engineering/Architecture
16. ☐ Agr./Const./Mining/Oil/ Transp./Utilities
17. ☐ Non-Computer Retailer/Dist.
18. ☐ Other Business or Service

3. Please indicate your primary business function: (Check one)
01 ☐ DP/MIS
02. ☐ Systems, Programming
03. ☐ Communications
04. ☐ Engineering
05. ☐ Res./Dev./Scientific
06. ☐ Accounting/Finance
07 ☐ Computer Consulting
08 ☐ Purchasing
09 ☐ Operations
10. ☐ Production
11. ☐ Education/Training
12. ☐ Marketing/Sales
13. ☐ Medical/Legal
14. ☐ Admin./Mgmt.

4. Is your company a reseller?
01 ☐ Yes 02. ☐ No

5. For how many nodes do you specify brands of networking products?
01. ☐ 10 or less 03. ☐ 26–99
02. ☐ 11–25 04. ☐ 100 or more

6. Do you plan to buy any network products:
01 ☐ Now 03 ☐ in 7–12 mos
02 ☐ in 4–6 mos 04 ☐ no plans

7. Please indicate the connections currently installed or planned for installation within the next 12 months at your current business location:

	Installed	Planned
01	☐ LAN to LAN	04 ☐ LAN to LAN
02	☐ LAN to Host	05 ☐ LAN to Host
03	☐ LAN to WAN	06 ☐ LAN to WAN

8. Number of employees in your entire company and at the site where you work:

	Entire Company	At This Location
01	☐ 25 or less	01 ☐ 25 or less
02	☐ 26–99	02 ☐ 26–99
03	☐ 100–499	03 ☐ 100–499
04	☐ 500–999	04 ☐ 500–999
05	☐ 1000 or more	05 ☐ 1000 or more

PC 5/16-1

Name

Title | Telephone

Company Name

Address

City | State | Zip

5. ☐ Please send me a one-year (22-issue) subscription to PC Magazine for $34.97 (U.S. price). all other countries add $36.00 for additional postage

FOR QUICKER RESPONSE FAX TO (609) 829-0692

FREE NETWORK PRODUCT INFORMATION

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 433 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

PC NETWORK EDITION MAGAZINE

P.O. BOX 11804
RIVERTON, NJ 08076-9404

Where the powerful get plugged in.

There's only one real power source for networking product coverage: *PC Magazine* and *PC Magazine Network Edition*.

No one else has more pages, covers more products, publishes more comparative product reviews. Nobody.

In fact, each year we deliver more in-depth product comparisons than the rest of the networking magazines combined.

It's no wonder. Our editorial staff includes leading industry lights like Frank Derfler and David Greenfield. And our testing labs are unparalleled.

All this means we're uniquely qualified to evaluate the nuances of extremely sophisticated networking technology. Last year, we led the way with the industry's first significant coverage of computer telephony. This year, look to us for incisive reviews of ATM and SQL database products. Plus spotlights and comparisons on distributed management, virtual networking, and IPng.

Of course, when you have unmatched editorial, something else happens. You attract an audience that can't be matched anywhere else, either.

That's why more network buyers and more network resellers rely on us than any other publication.

So if you want to raise your network to a higher power, we have a simple suggestion. Get plugged into the power source: *PC Magazine* and *PC Magazine Network Edition*.

©1995, Ziff-Davis
If you are already a PC Magazine subscriber you may be eligible to receive the Network Edition at no additional charge. Call us at 1-800-289-0429. Subscribers please mention Priority Code A1000.

The 3rd Dimension is Digital

3D FAX SOFTWARE

CONVERT YOUR PC FAX

FLAT FAX

It only sends a picture of your file, not the file itself. It's slow, not secure, and costs more than you think.

Best Software Utility - CeBIT 1994

Gold Medal - Communications Software Division 1993 Geneva International Invention Show

CUT The Time And Cost Of Faxing Up To 90%.

3D FAX™ Software for Windows® is a revolutionary new dimension in fax transmission. By encoding digital files as compressed images, it lets you use the global fax network to send them faster and for far less money.

COMPRESS A 30 Page Document To A One Page Fax.

Compression saves you transmission time as well as much of the staff costs of faxing. 3D FAXes can be sent to any PC fax. Or to any regular fax machine, then scanned using a flat-bed or inexpensive hand scanner.

COLOR Multimedia Presentations By Fax.

Since 3D FAX can encode the full digital file, you can send color, sound, even full-motion video. Proprietary error correction algorithms ensure that your presentation arrives error-free. Even over substandard lines.

SYSTEM REQUIREMENTS: 386 or higher PC running Windows® 3.1 or higher, with fax capabilities, VGA display, 10MB hard disk space, and 4MB available memory.

© 1995, Infolmaging Technologies, Inc. 3D FAX and Infolmaging are trademarks of Infolmaging Technologies, Inc.
Windows is a registered trademark of Microsoft Corporation. 3D FAX is protected by U.S. patent.

TO SEND FULL DIGITAL FILES.

SECURE Faxes With Password Protection.

If you've always wished there was a way to secure fax transmissions, you need 3D FAX. And password protection is just one of many exciting benefits. Try it for yourself.

InfoImaging

Infolmaging Technologies, Inc
3977 East Bayshore Road, Palo Alto, CA 94303
tel (415) 960-0100, fax (415) 960-0200

FREE

3D FAX Freeware, a 4-page limited-SEND and a complete READ module are free when you download it from the

INTERNET

http://www.infoimaging.com

info@infoimaging.com

or you can get it by phone for **$6.95** postage and handling. Use it as long as you want. Give it to whoever you fax to. Spread the savings!

For America Online, select "Go To Keyword 3D FAX"

3D FAX Software is available in two editions.

The **$99** package includes everything but the ability to send executable digital files and password protection.

The **$199** Professional edition adds those features plus professional color handling and double speed mode.

3D FAX will pay for itself almost immediately.

Order today!

1-800-966-1140

Or fax (415) 960-0200 for more information.

CIRCLE 016 ON READER SERVICE CARD

The New Texas Instruments TravelMate™ 5000

• 75 MHz Pentium® processor • Two Lithium Ion battery packs • Serial infrared port • 10.4" Active Matrix or 10.5" Dual Scan displays • 524 million bytes (=500MB) or 810 million bytes (=772MB) Hard Disk Drives* • 8MB RAM, expandable to 32MB • 2MB Video memory • Multimedia package: Built-in 16-bit sound, internal speaker & dual mode microphone

intel inside
pentium

Introducing The First Notebook To Maximize The Pentium's Full Potential.

When the rush was on to introduce a notebook with a Pentium™ processor, Texas Instruments decided to do what others thought couldn't be done.

We created a notebook that maximizes Pentium performance by integrating *full PCI bus architecture in our TravelMate 5000.*

And for flexible connectivity, we designed a way to allow external access from the PCI bus to the latest peripherals.

It was a challenge we addressed for two simple reasons: to give users true desktop Pentium performance for *faster running software and expansion capabilities* for investment protection.

So now you have a notebook with smoother full-motion video and enhanced 3-D graphics. In addition, we designed the TravelMate 5000 to take advantage of the "plug and play" capabilities of Windows 95® when it becomes available.

But our engineers didn't stop there. *We added a second lithium ion battery* without sacrificing size, weight or eliminating a floppy drive.

In addition, wireless communication with other notebooks and desktops is very quick and easy with our integrated infrared capabilities.

The TI TravelMate 5000. For more information on what others thought you couldn't do with a notebook, simply call 1-800-TI-TEXAS (e-mail: 2ti@msg.ti.com).

EXTENDING YOUR REACH™

TEXAS INSTRUMENTS

THREE YEAR

Warranty may vary from country to country. Contact your local TI office for details. Batteries and options are covered by a one year limited warranty. *Depending on model. TravelMate and "Extending Your Reach" are trademarks of Texas Instruments. Windows 95 is a registered trademark of Microsoft Corporation. Pentium is a trademark and the Intel Inside logo is a registered trademark of Intel Corporation. © 1995 TI

CIRCLE 353 ON READER SERVICE CARD

Getting Ready for WIN

1 MY COMPUTER offers instant pathways to drives, printers, the Control Panel, and the Dial-Up Networking utility.

2 FIND can search for files by name, size, date, and content.

3 NETWORK NEIGHBORHOOD outlines your network, integrating LANs and WANs with local resources.

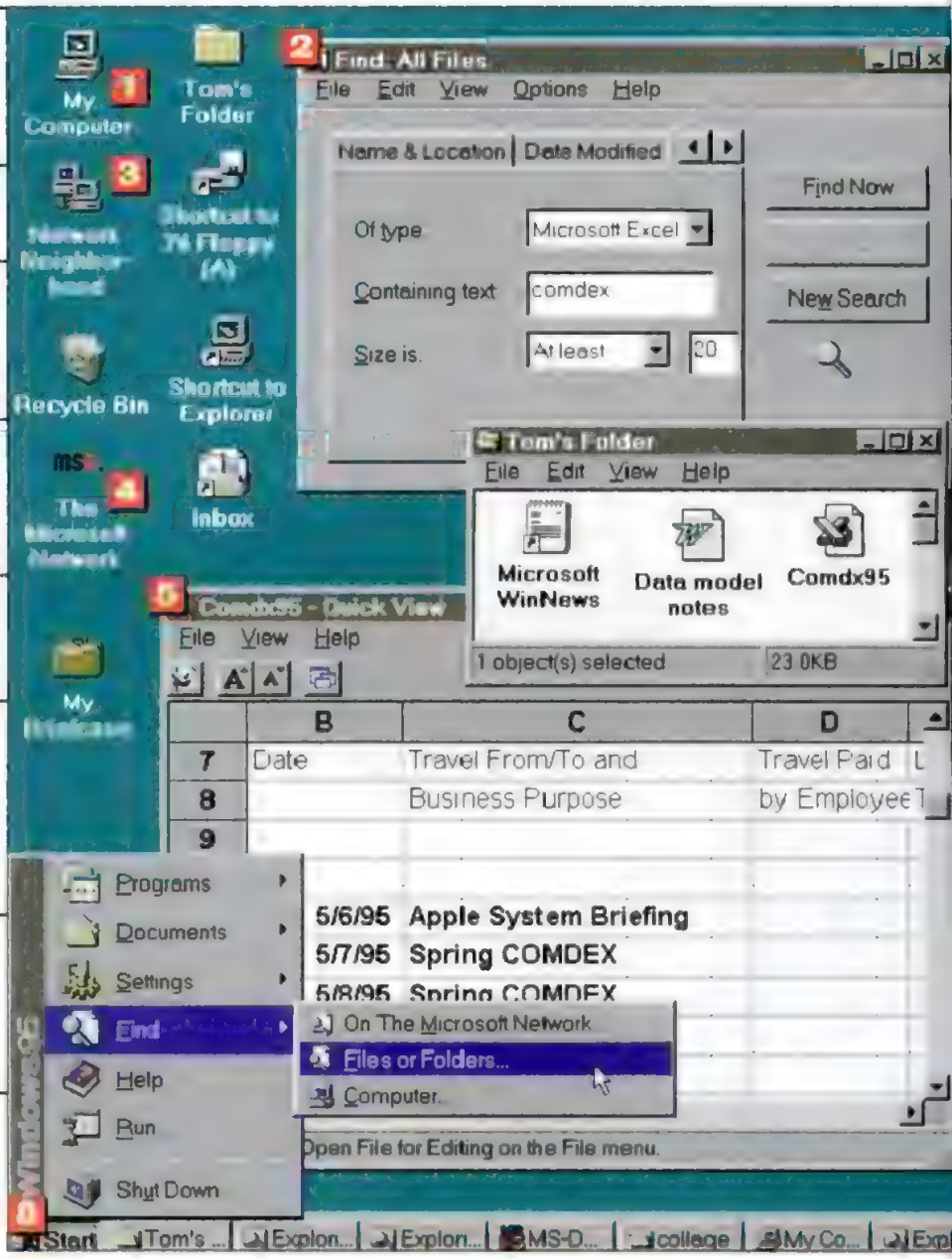
4 THE MICROSOFT NETWORK, Microsoft's budding on-line service, will be accessible through Windows 95.

5 QUICK VIEW is a file viewer that lets you quickly scan the contents of your documents.

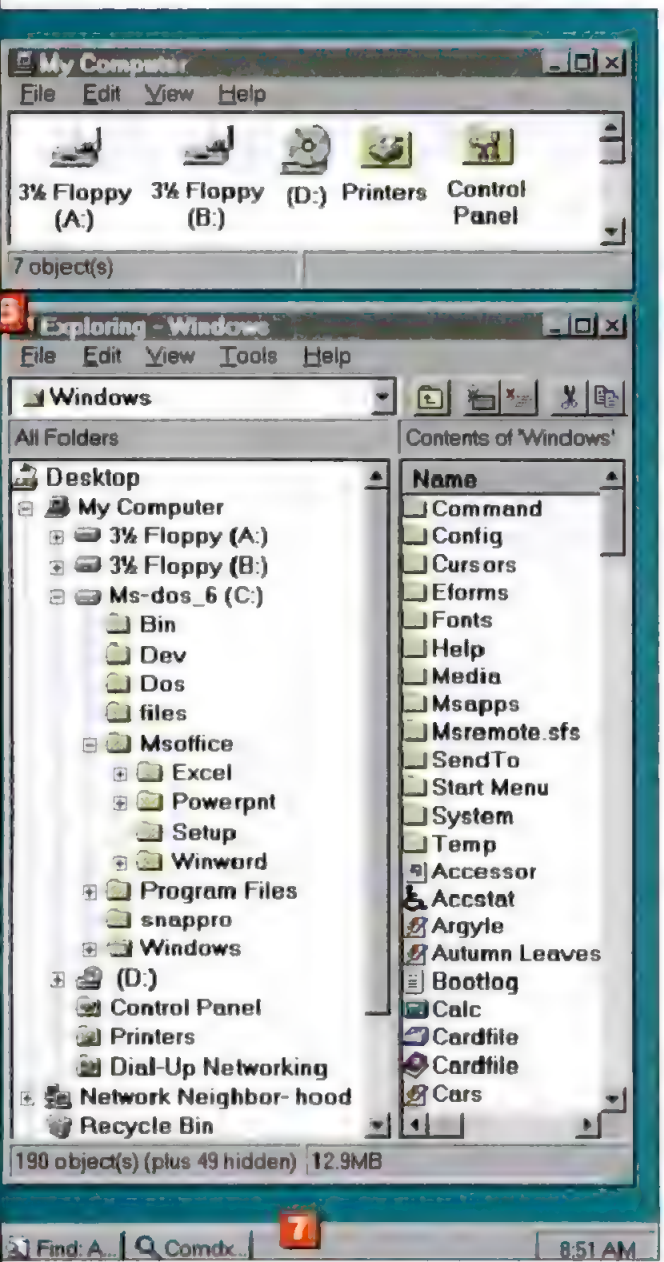
6 WINDOWS EXPLORER is a File Manager replacement that improves on the original and lets you manage files, local and network directories, desktop folders, and system utilities.

7 THE TASKBAR shows all open applications and active windows. Clicking on any task button brings the corresponding session to the foreground.

8 START gives you one-button access to a pop-up menu with programs, documents, utilities, and even system shutdown.



DOWS 95



Upgrade or wait? It's time for tough choices. Here's what you need to know.

By Michael J. Miller

If you're waiting for Microsoft to ship Windows 95, you aren't waiting alone. As software vendors frantically work on Windows 95 versions of their applications and as hardware vendors announce plans to preload the operating system on their machines, hundreds of thousands of users are already working with prerelease copies of Windows 95 and wondering what will happen when the real thing finally ships.

The level of interest is unprecedented. By the time you read this, Microsoft expects to have sold 400,000 copies of the Microsoft Windows 95 Preview Program beta, mostly to business customers who will pay $27 plus $5 shipping for the privilege of getting a head start on their implementation plans. Adding in the 50,000 origi-

IN THE COVER STORY

Under the Hood: Windows 95 and Its Competitors **139**
Plug and Play: Effortless Upgrades **159**
Communicating with Windows 95: Hooked and Linked ... **175**

IN THIS SECTION

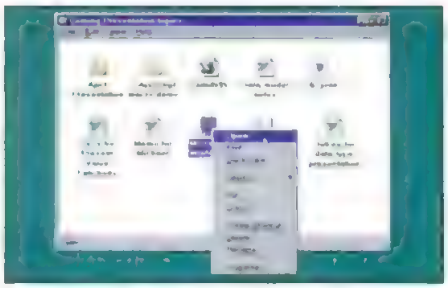
Previewing Performance 108
OS/2 Warp and Beyond 110
Windows 95: Myths and Realities 112
Jim Seymour on Windows 95 116
John C. Dvorak on OS/2 Warp 117
Windows 95, Going for the Logo 119
Preemptive Strikes: Support Strategies for Windows 95 120
Windows 95 New Software 130

COMPARATIVE USER INTERFACES

MICROSOFT WINDOWS 95

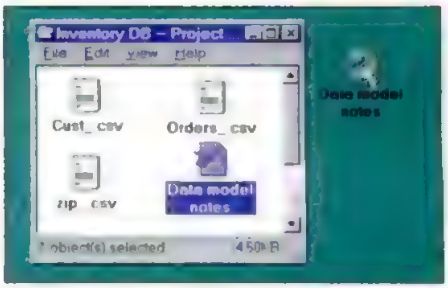
Users now get the advantages of an object-oriented interface, including a true desktop and icons, drag-and-drop copy and delete, nestable folders, and easily accessible property dialogs. The file system supports long filenames and is well integrated with the folder/desktop metaphor.

OPENING A DOCUMENT



Double-clicking an icon opens a file; right-clicking brings up an Open dialog.

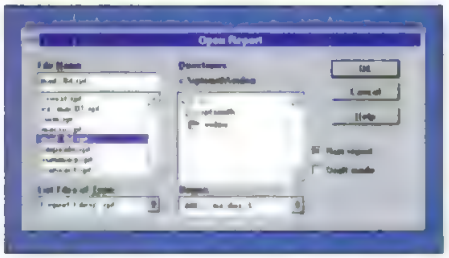
COPYING A DOCUMENT



Windows 95 now supports drag-and-drop copying throughout the UI.

MICROSOFT WINDOWS 3.1

Program Manager groups are basically just frames for program icons; groups cannot be nested. File Manager uses physical DOS paths only, so it can't see your groups. Drag-and-drop is limited and counterintuitive. You can't place documents, apps, or groups on the Windows 3.1 desktop.



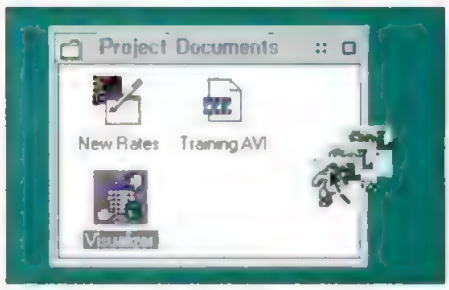
Most Windows 3.1 users do it the hard way by opening an application and using that app to open a document.

File Manager does offer an awkward form of drag-and-drop copying. Most users just fill in the command line.

IBM'S OS/2 WARP

The Workplace Shell is a deep, object-oriented interface with true folders and drag-and-drop support for copying, deleting, printing, and other functions. Object property sheets are easily accessible via right-click menus. The LaunchPad is a convenient place to dock often-used documents or apps.

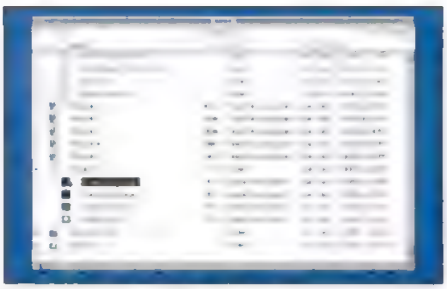
Open files on the LaunchPad, on the desktop, or in folders by double-clicking.



Everything on the Warp desktop is an object. Just drag and drop to copy.

THE MACINTOSH

The Mac has long offered most of the object-oriented interface features now considered standard, including program and document icons, a true desktop, double-click document launching, drag-and-drop copying, and the famous Trash Can. Physical paths for files and documents are hidden from the user.



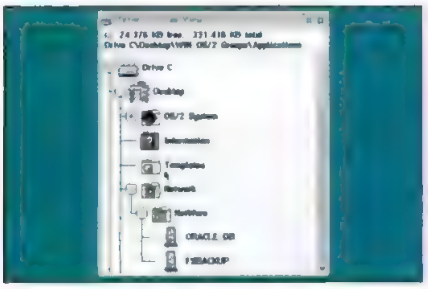
Most users just double-click a document icon to open a file.

The Mac has had drag-and-drop copying for years.

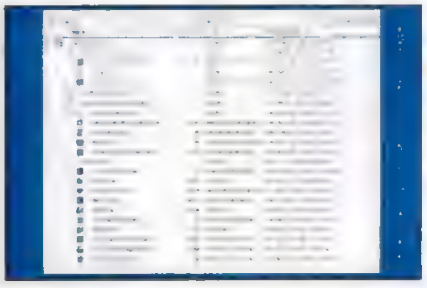
NAVIGATING YOUR SYSTEM

The Windows Explorer is a slick tool for local and network navigation.

You need Program Manager and File Manager to navigate groups and files.

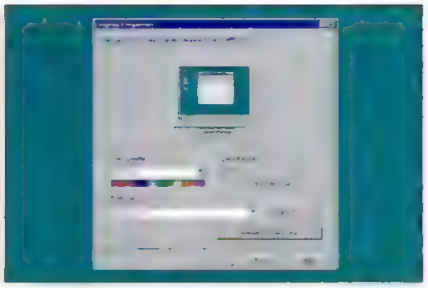


Warp gives you a hierarchical view of your system's files and objects.



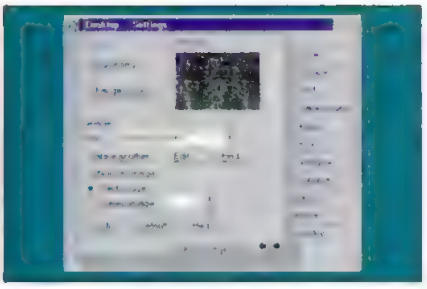
Users get a hierarchical view of local and network objects.

CHANGING PROPERTIES



Property sheets pop up when you right-click the cooresponding object.

Changing settings means digging deep inside the Control Panels items.



Warp's tabbed property sheets are accessed by right-clicking objects.

The Mac uses conventional property dialogs accessed via the Apple menu.

nal beta testers brings the total to almost half a million people who will see copies of Windows 95 before it officially ships (currently slated for sometime in August). We've never seen anything like this with any upgrade of an operating system or application.

But why? Certainly, it's not just the technology. From an architectural standpoint, it's easy to see where others have gone before Windows 95. Yes, it's a 32-bit operating system, allowing you to run 32-bit applications that are theoretically faster than current 16-bit apps. But 32-bit operating systems have been around for a long time, from Unix to the Macintosh System, IBM's OS/2, and Microsoft Windows NT. Through Microsoft's Win32s API, programmers have even been able to write 32-bit code that runs on top of the 16-bit Windows 3.1.

Windows 95 is also a multitasking, multithreaded operating system that can control multiple programs at once. And each program can have multiple concurrent *threads*, or independently executing subcomponents. But again, this is nothing new. Virtually all modern operating systems including OS/2, Unix, and Windows NT (but with the exception of Macintosh System 7) support preemptive multitasking and multithreading.

No, what makes Windows 95 the focus of so much attention is simple: It's the most significant upgrade to Windows since Version 3.0 came out in 1990. That release took a poorly selling add-on to DOS and turned it into the world's dominant PC operating environment. For years now, Microsoft has been carefully laying out the case for Windows 95 (originally code-named Chicago) as the logical next step for the estimated 70 million users who have joined the Windows fold.

Today, Windows 3.1 and Windows for Workgroups 3.11 come with some 85

FEATURES PLUS

From May 8 through May 12, you can go online to discuss the Microsoft Windows 95 Preview Program with Microsoft's Brad Chase (general manager, Personal Systems Group) and Brad Silverberg (senior vice president, Personal Systems Group). Hosting the event will be *PC Magazine* editor-in-chief Michael J. Miller and editor Robin Raskin. Type GO EDITOR from any CompuServe ! prompt.

We Just Reinvented The Most Powerful PC Very Little Money Can Buy.

The new Compaq® ProLinea® Family now combines real affordability with innovative new features that make it the most powerful desktop in its class. To start, you can choose the processor you want—from extremely fast (486DX2/50MHz) to blindingly fast (Pentium™ 100MHz). And the ProLinea is available in three new form factors: 3 slots/3 bays, 4 slots/4 bays, or 5 slots/5 bays.

We've also added TriFlex PCI Architecture, PCI Local Bus Graphics and a host of other features you'll find in the chart to the right. And, naturally, we've made the new Compaq ProLinea Plug and Play compliant. In short, the new ProLinea gives you a whole new way to think about business computing. And there's no easier way to get your hands on one than by calling Compaq DirectPlus.®

The New
Compaq ProLinea Family

Choose Your Compaq ProLinea

Processor	486DX2/66	Pentium 75MHz	Pentium 75MHz
Processor Upgradable	Yes	Yes	Yes
Std./Max. Memory	8MB/136MB	8MB/192MB	16MB/192MB
Hard Drive	420MB	420MB	720MB
Cache Internal	8KB	16KB	16KB
Cache External	256KB (optional)	256KB	256KB
Local Bus Graphics	PCI	PCI	PCI
Video Memory/Max.	1MB/2MB	1MB/2MB	2MB/4MB
Compaq SVGA Color Monitor	Yes	Yes	Yes
Diskette Drive	3.5" 1.44MB	3.5" 1.44MB	3.5" 1.44MB
Expansion Slots (Total)	3	4	5
Drive Bays (Total)	3	4	5
Ports: Serial/Parallel	1/1 (ECP)	1/1 (ECP)	1/1 (ECP)
Security Features	Yes	Yes	Yes
101-Key Keyboard, Mouse	Yes	Yes	Yes
Software Preinstalled	MS-DOS® 6, MS-Windows® 3.1	MS-DOS 6, MS-Windows 3.1	MS-DOS 6, MS-Windows 3.1
Energy Star Compliant	Yes	Yes	Yes
Warranty†	3-Year	3-Year	3-Year

*Call for Lease Price.

If your business requires a network solution, find out how the new Deskpro® can change the way you manage and support your network. It's all part of what we call Intelligent Manageability: including Asset Control, Fault Management and Compaq IntelliSafe™ hard drives. For more information, just give us a call.

*Leasing is provided by GE Capital Services for a term of 36 months and is subject to approved credit and certain terms and conditions. Call for details. †Restrictions and exclusions apply. Certain monitors, battery packs and options are covered by a One-Year Warranty. ProLinea is covered by a 3-Year Warranty. © 1995 Compaq Computer Corporation. All rights reserved. Compaq and the Compaq Logo Registered U.S. Patent and Trademark Office. Deskpro and ProLinea are registered trademarks, DirectPlus is a registered service mark, and IntelliSafe is a trademark of Compaq Computer Corporation. Products, prices and programs are subject to change without notice. Other products are trademarks or registered trademarks of their respective companies. Microsoft, MS-DOS and Windows are registered trademarks of Microsoft Corporation. Pentium is a trademark of Intel Corporation. Offer available in the U.S. only.

COMPAQ DirectPlus

1-800-888-5907

percent of new PCs and account for 62 percent of software sales. Not surprisingly, virtually all of the largest PC software developers have announced plans for Windows 95 versions of their applications, and PC vendors like Compaq and Dell have announced that Windows 95 will be the standard operating system loaded on most of their machines. With so much momentum, it's clear that a lot of people will be taking a hard look at Windows 95.

THE ISSUES YOU FACE

Windows 95 is an ambitious upgrade but one that involves trade-offs between advanced features and backward compatibility. It offers a number of major changes in the user interface, underlying architecture, and networking features; these will be attractive to many people but may cause others to seek out alternatives (such as OS/2 Warp or Windows NT) or even consider sticking with Windows 3.1.

In this story, we set out to preview the issues you will face as Windows 95 comes onto the market. Among the questions we consider:

- What are the implications of the new user interface?
- What's new in Windows 95's architecture?
- How will Windows 95 fit in with your existing network environment, and what new connectivity possibilities does it offer?
- How well does Windows 95 work with your existing machines and software, and how will it influence your future hardware and software choices?

We also look at how Windows 95 contrasts with alternatives such as OS/2 Warp or Windows NT and even Windows 3.1.

By now, you've probably heard the basic litany of what's new in Windows 95 many times. The user interface has changed dramatically, gaining such elements as true folders and icons on the desktop, animated icons, a Start button and a Taskbar to launch new applications, and a Recycle Bin for drag-and-drop deletions. The basic architecture has also changed to let you run 32-bit applications with preemptive multitasking, multithreading, and memory protection, so that one bad application is less likely to hang the whole system.

New hardware-support features, such as Plug and Play, AutoPlay for CDs, and several new enhancements aimed at portable computer users are designed to make the hardware and software work together better. Finally, there are new networking features designed to make Windows a better network client, including such things as remote-node access and a new universal mail box. Let's look at each of these areas.

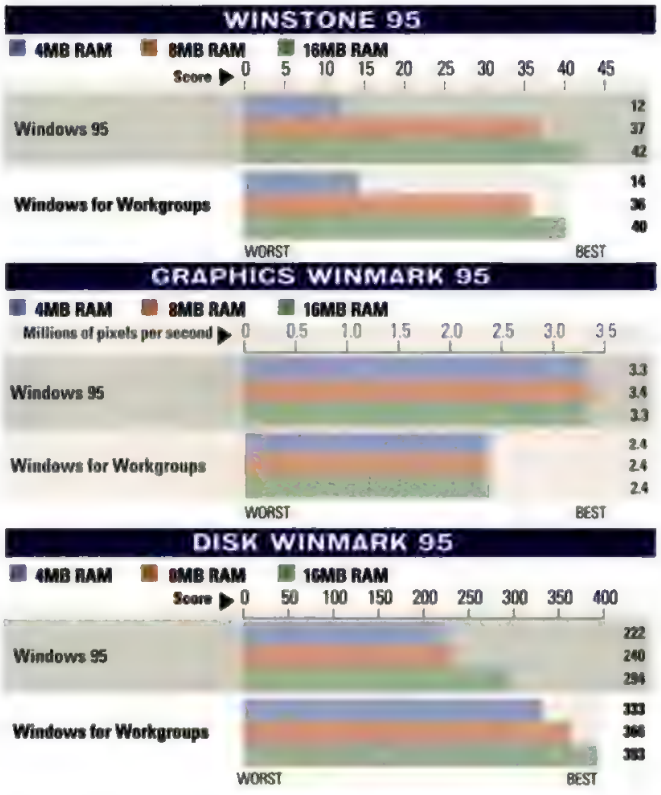
THE DESKTOP

The most visible changes are, of course, in the user interface. Windows 95 sports a number of fundamental improvements over Windows 3.1 designed to focus users on their documents instead of their applications.

Perhaps the most obvious is the addition of icons and folders to the desktop, thus combining many of the functions of Windows 3.1's Program Manager and File Manager. This new look—with subdirectories shown as folders and files appearing inside them as icons of spreadsheets, documents, or other objects—is a big change for Windows. To open a document or program, you just double-click on the icon. You'll also be able to nest folders inside other folders, giving you

THE MICROSOFT WINDOWS 95 PREVIEW PROGRAM: PREVIEWING PERFORMANCE

We tested the Windows 95 Preview Edition, which Microsoft is now selling to selected corporate customers, against Microsoft Windows for Workgroups 3.11. The charts below show the results of each operating system on our Winstone 95, Graphics WinMark 95, and Disk WinMark 95 test suites when run on a test machine with varying memory configurations. The test-bed was a Compaq Deskpro 486/33M with a 340MB IDE hard disk and a Number Nine GXE S3-based ISA video card. We tested at 800-by-600 resolution with 256 colors. At Microsoft's recommendation, we did not use SmartDrive in any of these tests. Windows for Workgroups' virtual memory cache size was set to one-fourth the size of physical RAM in each memory configuration.



Our Contributors: MICHAEL J. MILLER is the editor-in-chief and ROBIN RASKIN is the editor of *PC Magazine*. JOHN C. DVORAK and JIM SEYMOUR are contributing editors of *PC Magazine*. NICK STAM is technical director of hardware at PC Magazine Labs. THOMAS MACE was the associate editor in charge of this story, and JAY MUNRO was the project leader.

V-e-e-e-ry soon, hordes of the world's most savvy PC users will be moving to "Chicago".

Why wait for them? Your keys are ready now.

Key Tronic's new "Chicago" keys make the industry's best 101 keyboards even better. Three Windows-specific keys allow users to switch between active applications, access pre-loaded applications and files, and even create context-sensitive shortcuts designed to make running in the Microsoft® Windows® 95 world faster, easier and more productive. And, since every Windows 95 keyboard from Key Tronic comes bundled with Microsoft® IntelliType™ software, you can work in today's Windows 3.1 environment more efficiently than ever before.

No doubt about it, there's probably a trip to "Chicago" in your future. But why wait? Get your keys to Windows 95 today.

KEY TRONIC®

BUILT TO LAST.

PERIOD.

KEY TRONIC® 25 YEARS QUARTER CENTURY OF QUALITY

To find out more about the full-line of Windows 95 keyboards from Key Tronic and why you should buy one today, call 1-800-262-6006.

©1995 Key Tronic Corporation. Key Tronic is a registered trademark of Key Tronic Corporation. The Key Tronic 25 YEARS logo is a trademark of Key Tronic Corporation. Microsoft, Windows 95 and Windows 3.1 are registered trademarks of Microsoft Corporation. IntelliType is a trademark of Microsoft Corporation.

CIRCLE 262 ON READER SERVICE CARD

intuitive visual management of subdirectory hierarchies.

A new Taskbar at the bottom of the screen provides a button for each program you're currently running and each window you have open or minimized on your desktop. You simply click on a button to switch to a particular program or window. In addition, a Start button on the left side of the Taskbar brings up a pop-up menu that lets you quickly move to any application or document, search for programs, run Windows help, or shut down or suspend Windows itself.

Another big change is the addition of object-oriented functionality to the desktop. For example, when you right-click on any icon, you immediately access a menu that lets you see all the things you can do to the underlying object (which might be a file, program, or system component such as a drive). Depending on the object, you could then open it, copy its contents, or change a variety of other property settings. This approach extends to the file system itself; to copy a file, you simply drag it from one window to another. In this way, the functions of Program Manager and File Manager have been combined and extended.

OS/2 Warp and Beyond

By Michael J. Miller

Finally, Windows 3.1 users are getting 32-bit operation, preemptive multitasking, multithreading, and an object-oriented desktop. Big deal, say OS/2 users, who've enjoyed these features for years.

Since Version 2.1—which introduced a full 32-bit implementation and the Workplace Shell user interface—OS/2 has kept essentially the same underlying architecture it uses today. Since OS/2 Warp Version 3 (the most recent OS/2 release) has no need to play catch-up on fundamentals, it focuses instead on usability, cosmetic enhancements, and additional utilities.

Since Warp has no need to play catch-up, it focuses on usability and additional utilities.

Known as the BonusPak, the utilities include IBM Works, an entry-level integrated software package, and the Internet Access Kit—the most complete set of Internet tools yet shipped with a PC operating system. (And it's more advanced than the Internet tools promised for Windows 95.)

In February, IBM shipped OS/2 Warp 3 Full Pack, which includes the Win-OS/2 libraries. These effectively give you the ability to run Windows software without having to own a licensed copy of Microsoft Windows. In the near future, IBM will be focusing its efforts on four new versions of OS/2 that each offer a healthy dose of networking features.

WARP CONNECT

The first new OS/2 Warp version, Warp Connect (slated for release by the time this article appears), will include the most important network drivers and utilities. Planned new features include requesters designed to connect OS/2 clients directly to NetWare 3.*x* and 4.1 and OS/2 LAN Server–based networks.

Warp Connect will also include IPX and NetBIOS support, as well as a new TCP/IP protocol stack. IBM says that this new stack will include PPP connections instead of just the SLIP connection provided in the base OS/2 Warp pack. This stack will offer reduced CPU utilization and provide concurrent access to your network and the Internet.

In addition, Warp Connect finally includes the long-awaited OS/2 peer-to-peer networking services. These will let you share files, printers, and applications via either a parallel port or a network card. IBM says it will include drivers in the box that support about 70 percent of existing Ethernet cards and 90 percent of Token-Ring cards. The same software will let a Warp Connect client connect to a LAN Server 4.0 server, allowing an easy upgrade from a peer network to a client/server network.

Warp Connect will also include IBM's LAN Distance software, which enables remote dial-in to a connection server on a network and subsequent point-to-point connections to any devices on the network. Unlike Windows 95, Warp Connect does not include facilities to turn your PC into a dial-up server. Other new features include ASK PSP, a new help database CD with an English-like query interface.

On the mail side of Warp Connect, IBM has chosen to bundle Lotus Notes Express rather than its own Ultimedia Mail/2. Notes Express lets you connect to any Notes server, although you can use only seven preinstalled templates.

Like the standard Warp edition, Warp Connect will also come in two versions: one without the Windows libraries and the other as a Full Pack that includes Win-OS/2.

EXTEND PACK

IBM is planning yet another set of utilities, tentatively called the Extend Pack, which is designed for larger enterprises and which the company will offer its corporate customers. The Extend Pack will include mobile file synchronization, 3270 emulation, full SNA stacks (including APPC support), and a remote client for Shiva dial-up modems. New network management utilities will include a systems performance monitor and hooks for the NetView Distribution Manager 2.0

Everything in the environment, even the desktop itself, shows object-oriented behavior. By right-clicking on the desktop, you pull up a menu that lets you arrange your icons or change desktop properties such as your wallpaper, screen saver, or Windows color scheme. You can even change your display resolution and color depth on the fly, if your display hardware supports it.

Much of this is just Windows 95 playing catch-up, of course. The folder-and-icon metaphor dates back to work at Xerox PARC two decades ago and has long been on the Macintosh. Object-oriented desktop paradigms were pioneered on the PC years ago in products like HP's NewWave, NeXT's NeXSTtep, and OS/2's Workplace Shell. The Taskbar concept is very similar to Dashboard 2.0 (originally from HP, now from Starfish Software), or the Launch Pad in OS/2 Warp, Version 3.

GETTING USED TO IT

If you're used to Windows 3.1, you'll find that performing basic file management from the desktop by dragging and dropping file icons takes some getting used to. But you'll soon notice how much power this UI can offer. For example, a single icon called My Computer provides access to your drives (and all the files they contain), the Control Panel, your printers, and dial-up networking options. The Windows desktop also comes with a Mac-like Recycle Bin that you can use to delete files (just drag the file's icon into the bin), and you can put a printer on the desktop to enable drag-and-drop printing. Clicking the Network Neighborhood icon displays all the servers and printers in your immediate workgroup, and clicking Entire Network displays all the servers you can connect to—which could be dozens in a large corporation.

You'll also have to rethink file-naming conventions. The familiar DOS filenaming scheme of eight characters followed by a three-character extension has been replaced by long filenames (for example, "Getting Ready for Windows 95"). Much of this, however, is skin-deep. Internally, the file system still stores filenames in the old FAT scheme, automatically picking the most logical choice. This is so that files can be opened by existing Windows applications, which typically don't allow or recognize long filenames. But you should expect all new applications to work with these new names, which now can be as long as 255 characters.

In addition to performing basic file management from the desktop, you can also use the new Windows Explorer, essentially a souped-up File Manager. Since Explorer uses an outline metaphor, you can get to all your drives, whether local or network, from the same window and view them as large or small icons or a list.

A much-improved Find command (which you can run from Explorer or directly from the Start menu) can scan all or part of a disk for files matching specified criteria, including embedded words

agent for remote distribution of software. IBM currently plans to offer the Extend Pack to corporations for a nominal material and fulfillment fee at the same time as Warp Connect.

OS/2 FOR THE POWERPC

Though Warp 3 didn't bring changes to OS/2's underlying architecture, that change is coming this summer. IBM has long talked about a future operating system called Workplace OS based on a microkernel architecture. Originally, various operating system personalities—including OS/2, Windows, AIX, and possibly the Macintosh System—would have run on top of that kernel, potentially at the same time.

The multiple personalities part of the plan has since been shelved, but the rest remains. IBM plans the first release of the microkernel-based operating system this summer; it will be called OS/2 Warp for PowerPC. The system will rely on emulation to provide backward compatibility. In particular, it will run the Win-OS/2 library through emulation of the Intel *x*86 architecture, thereby letting you run Windows 3.1 applications. IBM plans a microkernel-based version of OS/2 for *x*86-based PCs sometime in 1996.

THE BIG PICTURE

IBM says it has now sold more than eight million copies of OS/2, including upgrades and multiple versions. It also claims that more than one million copies of Warp 3 have been shipped to dealers since it was introduced in November 1994. (For more information, refer to "OS/2 Warp 3 and Windows NT 3.5: The Future's Here Today," December 20, 1994.)

OS/2 still lacks the broad native application support of Windows 3.1, though there are signs that this may be changing. Lotus plans to release its next generation of applications for both OS/2 and Windows, and other developers such as Corel are reconsidering their plans. In the meantime, OS/2 (either the Warp Full Pack or an earlier version installed on top of Windows) runs most Windows 3.1 applications quite well. Warp can run applications written to the Win32s API but does not support Win32 as implemented in Windows NT or Windows 95. IBM says it has the rights to support such applications and will do so if its customers so desire.

From an architectural standpoint, Warp is already far more sophisticated than Windows 3.1. It also offers some features not found in Windows 95, like the ability to run Windows 3.1 sessions in separate virtual machines. And it gives you more extensive customization of Windows and DOS applications than either version of Windows. Warp does have some disadvantages (such as a single input queue), but the additional networking support of Warp Connect and the coming microkernel version will add strength and flexibility to an already powerful platform. □

► **OS/2 Warp Version 3.** List price: *$129.* **OS/2 Warp Version 3 Full Pack.** List price: *$199.* **OS/2 Warp Connect Version 3.** List price: *$229.* **OS/2 Warp Connect Version 3 Full Pack.** List price: *$299.* **OS/2 Warp Connect Version 3 with Extend Pack.** List price: *$235.* IBM Corp., *Armonk NY 10504; 800-342-6672.*

Circle 452 on reader service card

and phrases; you can also save commonly used searches. Find can also find other computers on your network. Another slick new feature is the Quick View option. When you right-click a document object on the desktop or select a document in Explorer, you can choose Quick View to scan the contents of the file without having to load the app that created it.

The Windows 95 viewers are based on viewers from Systems Compatibility Corp.'s well-known Outside In/for Windows. At press time, Microsoft was planning to ship a basic set of file viewers to OEMs and on the CD version but was undecided whether viewers would be included with the floppy-disk-based product. We also expect a number of third parties, including Systems Compatibility, to ship viewers for other applications and to extend Quick View's functionality (by enabling printing from a view, for example).

Explorer is different enough from File Manager that it takes some getting used to. For instance, you now see the amount of free disk space on a drive only when the drive is selected in the Details window. But Explorer offers much better integration and smoother operation. You can finally move a file from one drive or directory (folder) to another without opening multiple windows, for instance. Many third-party file management utilities have had these features for some time, but it's good to have them in the base operating system. Again, you should expect a lot of third-party programs designed to enhance or replace Explorer.

Another useful enhancement, called Shortcuts, gives you the ability to create icons that point to objects (such as files, folders, or programs) that are normally stored somewhere out of view. You can place Shortcut icons almost anywhere in the user interface, although the desktop or the Start-button menu are the most convenient locations. Typically, you'll use Shortcuts to access regularly used documents or programs. By clicking on the Shortcut, you launch whatever object it points to. (This approach is similar to the Shadows used in OS/2's Workplace Shell.)

Finally, there are many cosmetic changes, including the 3-D look of menus and icons and the new animated icons that show actions such as windows being opened or files being copied or moved from one folder to another.

In summary, there is a lot to learn. Though Microsoft has done some things to make the transition easier (like converting your Program Manager groups into items on the Programs menu), even the most experienced Windows user will need several hours to feel at home. At the beginning, at least, some Windows 3.1 users may find the interface actually slows them down for certain operations.

ARCHITECTURAL INNOVATIONS

The basic architecture of Windows has changed significantly. Most dramatically, DOS and Windows are now combined as one operating system.

Windows 95 offers a 32-bit applications programming interface (API), called Win32c, that incorporates most of the Win32 API from Windows NT and adds a few extensions. Indeed, we've been able to run Windows NT applications such as Word and Excel under Windows 95, where they behave as native applications.

For some kinds of applications, particularly ones that involve large files or calculations that use 32-bit register operations, 32-bit support could result in faster execution of 16- and 32-bit applications. But in many cases, developers have had so many years to tune their 16-bit applications that you may not see an improvement from a move to 32 bits. You should also expect to see many developers write their first Windows 95 applications using a combination of 16- and 32-bit code. Of course, competing operating systems (including OS/2 and Windows NT) have had 32-bit APIs available for some time. Developers can even write 32-bit applications that run under

Windows 95: *Myths and Realities*

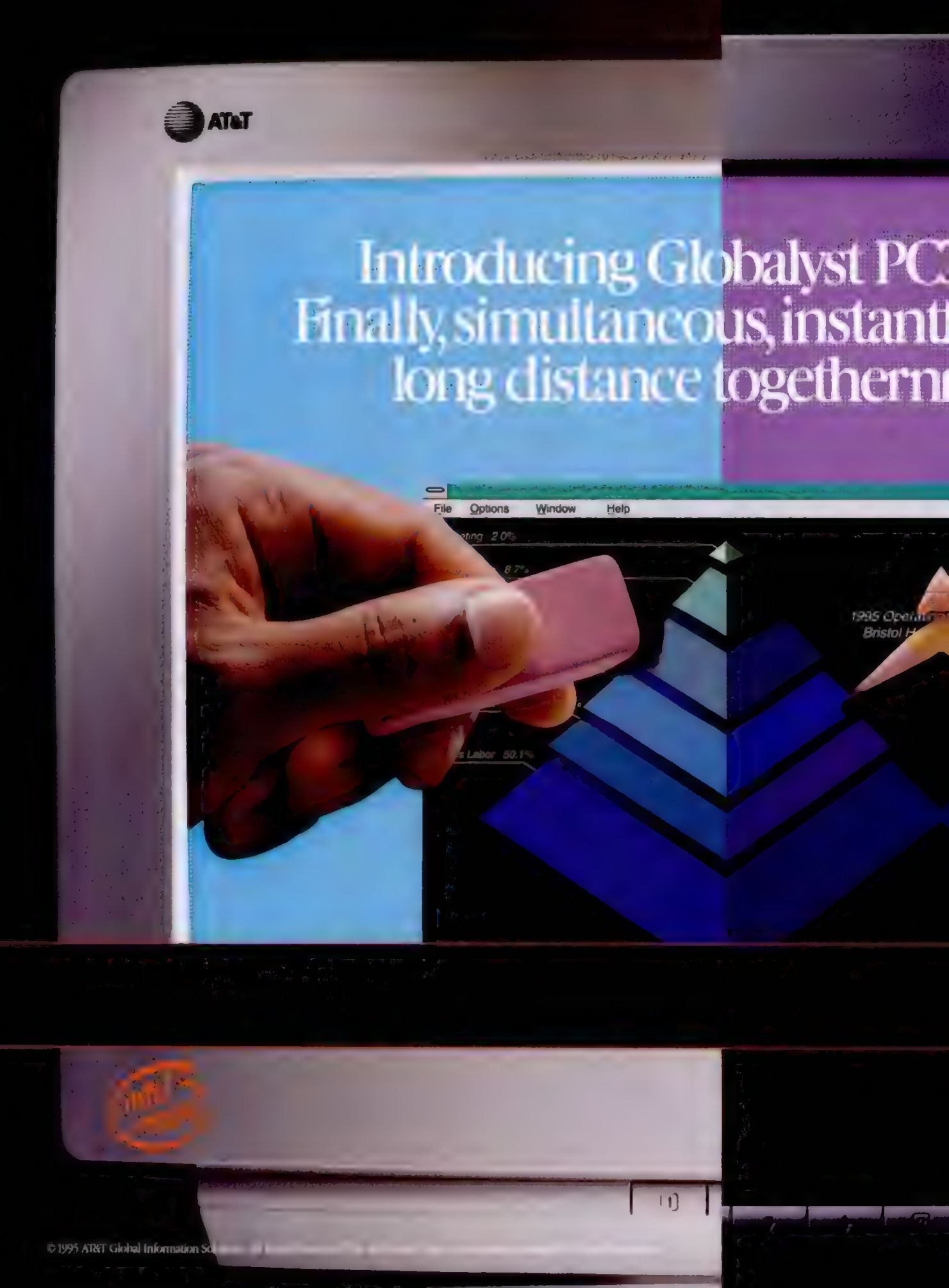
By Michael J. Miller

MYTH: DOS is gone, and Windows 95 is a completely new operating system.
REALITY: Most of Windows 95 is new, but it still has a DOS component and some DOS structures—mostly (but not entirely) for backward compatibility.
MYTH: Now I can quit worrying about low and high memory.
REALITY: More drivers and utilities are being written as virtual device drivers. They reside above 1MB, but you can also load real-mode device drivers and TSRs in lower memory. But you can still run out of lower memory, which is why Windows 95 includes MemMaker and why third-party memory managers are still important.
MYTH: Program Manager and File Manager are dead.
REALITY: Program Manager is dead, replaced by a true desktop. But you can think of Explorer as File Manager 4.0.

MYTH: Windows 95 is "crash-proof."
REALITY: *Nothing* is crash-proof. It's more difficult to crash Windows 95 than Windows 3.1, but badly behaved programs can still bring everything down.
MYTH: Plug and Play means adding new cards and software will be completely seamless.
REALITY: Plug and Play is great on paper, but you'll need a machine with a custom BIOS and adapter boards.
MYTH: 32-bit applications are faster than 16-bit applications.
REALITY: For some tasks, 32-bit is faster. For others, tight hand-tuned 16-bit code may still be superior.
MYTH: Windows 95 is much easier to learn than Windows 3.1.
REALITY: Maybe for new users. But if you're used to Windows 3.1, prepare to spend some quality time with this new operating system and its new desktop before you really feel at home. □

Illustration by Timothy Cook

Say goodbye
to working in
an isolation
chamber.



© 1995 AT&T Global Information

The first computers with true application sharing. For instant collaboration, not isolation.

Take a look at your average workday. Half of it can end up just plain wasted. Sitting in meetings. Running to the fax machine. Going through rounds of revisions on every document. You know the story.

Now welcome to the exciting new world of Personal Computing and Communications—PC&C. Discover AT&T Globalyst,® the first computers with AT&T Vistium™ Share Software. It lets you and a client or colleague share live Windows™ files, make changes in real time and transfer the final document to either user. Even if only one of you has the application you're sharing. Work with someone a thousand miles away as easily as if they were across your desk.

Best in reliability & service support
PC World, November 1994

Because they're from AT&T, Globalyst PC&Cs aren't some proprietary system, but open, industry-standard, Intel™ processor-based technology.

There are three easy ways to order your AT&T Globalyst PC&Cs. From America's premier resellers, from convenient retail locations or direct. And you can reach them all at this number:

1 800 542-9907

Can spontaneous collaboration make a difference in your business? Call today. We'll tell you more.

GET
move
USE
IT.

Now that NCR and AT&T are one, computing and communications have come together to help you get, move, and use information.

AT&T
Global Information Solutions

Windows 3.1 using the Win32s subset of the Win32 API.

The basic information about most new 32-bit programs will be stored in a system registry, similar to that used by Windows NT, OS/2, and OLE applications running under Windows 3.1. In most cases, this registry takes the place of the .INI files for Windows, the system, and for applications. The registry is complex and not designed for most users to edit manually. Again, it's an area where third-party utilities could improve on the product's basic functionality.

Windows 95 supports preemptive multitasking of 32-bit applications, meaning that the operating system doles out fixed amounts of system resources to as many applications as you have in use. Each 32-bit app also runs in its own protected address space, lessening the chances that one rogue program will hang the entire system. But 16-bit Windows 3.1 applications all run in the same address space, where they are cooperatively multitasked. One bad Windows 3.1 app can still bring down the others, and the division of system resources is less predictable. In comparison, OS/2 and Windows NT offer an option for handling 16-bit Windows apps more gracefully, letting you run them in individual, protected address spaces. Though setting up the details of individual versus shared memory in OS/2 or Windows NT can be complex, it does provide better safety and more predictable execution.

Unlike OS/2 or Windows NT, Windows 95 does include a DOS compo-

Windows 95: *Best Bet for the Mainstream*

By Jim Seymour

We've waited so long for Windows 95 that our expectations are sky-high. Windows 95 has been sold (oversold, perhaps inevitably) as the answer to all our Windows problems—maybe to the world's problems, as well.

Of course, Windows 95 won't meet all those expectations; we're kidding ourselves if we ignore its not-so-good aspects. At the same time, it has a host of important new features and improvements. On balance, the good far outweighs the bad; this is a solid, important upgrade.

Don't look at Windows 95 as a performance upgrade—especially if you define performance in terms of speed. As a 32-bit operating system, it *should* run faster. Realistically, the first release of Windows 95 and the first apps written for it won't take full advantage of the new 32-bit architecture.

Windows 95 will improve on Windows 3.*x*'s marginal multitasking right away, however. When one program went south in Windows 3.1, it was all too easy for everything else to go along. Windows 95 already seems more stable, and I'm optimistic about finally being able to breathe deeply when running important jobs.

Another long-standing gripe, resource limits, gets fixed. With Windows 3.1, two hidden 64K memory heaps manage essential system functions. When these system resources fall below about 15 to 20 percent, you're heading for a crash. In Windows 95, system resources still count, but you're much less likely to run out of them. I've been able to run many more applications simultaneously under Windows 95. And it cleans up after ill-behaved apps (including Microsoft's own) that upon closing don't give back all the resources they claimed.

Plug and Play? Windows 95–equipped PCs still won't be as easy to set up and reconfigure as Macs. But they'll be a lot easier to rejigger than any *x*86 PC you've used before. A Plug and Play–compatible computer checks attached components when it boots and handles such irritating grit in *x*86 designs as IRQ and port assignments automatically.

"In a nutshell, most of Windows 95's changes are profound and welcome."

NETWORKING AND THE INTERNET

The Microsoft Network, an entirely new venture, poses a challenge—but not necessarily a threat—to on-line services such as America Online, CompuServe, GEnie, and Prodigy, as well as New Age on-line wanna-bes such as AT&T's Interchange. Whatever the merits of The Microsoft Network, it can't hurt Microsoft to have the necessary connection software installed on perhaps 25 million PCs by the end of 1995.

The quality or even the existence of Windows 95's built-in Internet tools is as yet unknown, but Microsoft has been investing in the right companies and technologies to provide a first-class connection and a great Web browser.

Finally, moving to Windows 95 is frankly unsettling for Windows 3.1 users. The interface is completely different. Double-clicking has nearly disappeared. Program Manager has been replaced. But the learning curve, while steep, is short. I estimate most Windows 3.1 users will pick up the essentials in about half an hour. Becoming comfortable may take another two or three hours. At first, Windows 95 seems hopelessly awkward, but trust me: It's worth the effort, and you'll soon feel at home.

That's it, in a nutshell. Most of Windows 95's changes are profound and welcome. The areas that still need improvement are likely to get attention from Microsoft in a second release sometime in late 1996. Until then, Windows 95 looks to me like the best bet for a mass-market PC operating system. □

Photograph by Bill Albrecht

nent—effectively MS-DOS 7—that lets you use real-mode device drivers and TSR programs. This is necessary for compatibility, but does mean that a bad driver or TSR is free to crash the entire system.

From the developer's standpoint, Object Linking and Embedding (OLE) is also a crucial part of the Windows 95 story. Microsoft has long been pushing OLE—with its support for compound documents, cross-application macro control, and common object registration—as a critical API. In fact, Microsoft requires OLE support in order for an application to get the coveted Windows 95 logo. (Recently, the company softened its position by announcing that it might also award the logo to applications written to Component Integration Lab's OpenDoc specification, a competing object standard that should be compatible with OLE.)

For a detailed discussion of the Windows 95 architecture, see "Under the Hood: Windows 95 and Its Competitors."

PLUG, PLAY, AND PORT

Many of the innovations in Windows 95 are designed to make Windows work better with hardware. The most obvious improvement in this area is Plug and Play, a new specification designed to make an operating system recognize and control any peripheral. Plug and Play is designed to put an end to the configuration frustrations that just about all of us have experienced with PCs. But to take full advantage of this scheme, you'll also need a Plug and Play BIOS and add-in boards.

▪ OS/2 Warp: *Deep, Rich, and Powerful*

By John C. Dvorak

More than a few people have suggested that OS/2 Warp now has an opportunity to become important, because Windows 95 is very late. In fact, its chances would be much better if Windows 95 were actually shipping so that the two systems could be compared head to head. But since Windows 95 is still in beta testing, you can't honestly do the necessary comparison. Anytime someone tries to compare the two, the critics complain that it's unfair. Meanwhile, the Windows 95 boosters seem free to promote their unseen darling like a lover buying a mail-order bride: All that ardor is based on pictures.

While this continues, Warp is at an extreme disadvantage. And even worse, the excitement over Warp will be ebbing just as Windows 95 hits the streets. Warp will be perceived in the market as *old,* and Windows 95 (or Windows 96) will be perceived as *new.* It's another classic case of Microsoft outfoxing IBM, quality be damned.

But at the heart of it all is Warp itself. The more I use Warp, the more I see its greatness. I find it to be phenomenal. And the BonusPak, which includes an easy-to-use Internet browser and Internet access tools, is worth the price of the whole package.

Warp is deep. It's deep with power, deep with richness. The BonusPak makes it deep with a slew of applications that are very cool. With Warp, you can almost avoid buying any other applications. It's that complete.

When looked at objectively, Warp (even with the BonusPak) is an enormous loss leader for IBM. If it really took off in sales, I can assure you that Microsoft would be suing IBM in court for dumping a product in the market—and Microsoft would win! I'm personally stunned that the majority of computer users haven't seen this offering as the deal of the century and kept Warp at the top of the bestseller list.

"The more I use Warp, the more I see its greatness. I find it to be phenomenal."

GIT ALONG, LITTLE DOGIES

But they haven't, and I don't expect them to change. Once the Microsoft ring is in their nose, they don't veer too far away from the path set out for them. The current path is one of waiting and grazing. I suppose the best we can do for these users is to turn them away from the storm when it comes so they don't swallow too much rain and drown.

What they *will* have a tough time swallowing, however, is the fact that Microsoft's desire to copy Apple and The Macintosh Way will result in their inheritance of the exact same problem that Mac users have: The constant need to upgrade all applications. Windows 95 and its offerings will not be nearly as backward-compatible with old applications as Warp. Warp's VDMs (Virtual DOS Machines), that "better DOS than DOS" they talk about, are indeed better than DOS. They allow me to multitask a few old DOS programs in ways I never could before. Multitasking old DOS programs with Windows 95? I think not.

Though newcomers don't care, the power users who really use their computers and actually do have legacy applications will prefer Warp. And users who do not want to get onto the upgrade merry-go-round will prefer Warp. And users who like depth, power, and even a degree of nerdiness (sorry, guys) will prefer Warp.

But Warp users must realize that the next wave of users are being cajoled by programs like Microsoft Bob. They are the ones who will slide into Windows 95 comfortably. And Warp users must realize that Microsoft has smart kids who work 16 hours a day to beat IBM. The smart kids at IBM with this kind of energy are unseen and unheard. It's a problem. But do I care? I use Warp, and I can do a lot with it. □

Photograph by Anne Hamersky

Alexandre Patty had a rather distinctive approach to descending a staircase. Since he obviously preferred doing things the hard way, he probably wouldn't have been interested in faxing with Delrina WinFax PRO.

Given the choice between using an elevator or your head to go down a flight of stairs, you'd probably opt for the easier way, right? So if you're not already faxing with the award-winning WinFax™ PRO 4.0 fax software, you should be. Because it is, quite simply, the easiest and most convenient way to send and receive faxes. By faxing with your PC, you'll save countless trips walking to the fax machine. And WinFax PRO makes sending a fax from within any Windows application as easy as printing a document.

WinFax PRO is available alone or in the Delrina Communications Suite™

Organizing sent and received faxes takes just a couple of mouseclicks, and you can even schedule a fax transmission for a specific date and time in the future. So visit your local dealer today, or call 1-800-664-2714 to upgrade or to order WinFax PRO, the world's best-selling fax software. Anything less is sure to be a headache.

Year after year, Delrina WinFax PRO has won nearly every major industry award – for features like fax autoforwarding, remote retrieval and handy graphics tools, including one that lets you add your own signature. You also get dozens of ready-to-use cover pages, OCR, group faxing, drag-and-drop addressing, and you can even have a document faxed to some and e-mailed to others. No wonder *PC Computing* recently said, "The best fax software just got a whole lot better."

DELRINA

Delrina, WinFax and Delrina Communications Suite are trademarks of Delrina (Canada) Corporation WinComm is a trademark of Delrina (Delaware) Corporation. All other product names are copyrights, tradenames, registered tradenames or trademarks of their respective owners. ©1995 Delrina (Canada) Corporation. All rights reserved. PC Computing quote from 5/94. © Ripley Entertainment Inc

CIRCLE 250 ON READER SERVICE CARD

Similar features are available as add-ins for Windows 3.1; OS/2 and Windows NT are expected to get Plug and Play upgrades at some point.

In the meantime, our experience with Plug and Play has been mixed. With Windows 95, a machine with a Plug and Play BIOS, and boards specifically designed for Plug and Play, preliminary testing has demonstrated nearly trouble-free operation. But with older machines or even new machines with older boards, we ran into a lot of difficulties. (See "Plug and Play: Effortless Upgrades.")

The elegant new AutoPlay feature offers instant access to AutoPlay-compatible CDs. Just put one in your CD-ROM drive and it will play, eliminating software setup and unnecessary directories on your hard disk.

A number of other changes are designed to make Windows 95 work better with portable computers. One advance is that the system can now recognize multiple configurations, so that it can automatically detect if the portable is plugged into a docking station. This would allow your laptop to check for a network connection or a CD-ROM if you are plugged into the dock, but not otherwise. Theoretically, this technology could even be used to change your display resolution on the fly, so that you could use standard VGA resolution on your laptop screen but immediately switch to a higher resolution when you plug into a larger monitor. You won't be able to change your color depth on the fly, however, since the system forces you to restart the machine—something not necessary with the Macintosh.

Other portable-oriented basics included in the operating system are a Suspend option on the Start menu and a built-in battery meter, which appears in the Taskbar. Some of the biggest differences between Windows 95 and Windows 3.1 or even Windows for Workgroups 3.11 center on networking. Windows 95 is a far better network client and has a lot of additional networking features.

NETWORKING NICETIES

Windows 95 comes out of the box as a client for both NetWare and Windows networks and includes the NetBEUI, IPX/SPX, and TCP/IP protocol stacks. Windows 95 is also currently being tested by other companies as a client for NOSs such as Banyan's VINES, Digital's Pathworks, and FTP's NFS. (You can still use older real-mode clients or drivers, although in practice, we ran into occasional but unexplained problems.) Like Windows for Workgroups, Windows 95 comes with the software to act as a server on a Windows network, providing peer-to-peer networking services.

Microsoft has also developed a variety of new networking utilities; although at press time, the company was still undecided whether to include them in the final package. The utilities include Netwatch and System Monitor (which let you monitor the performance of your machine as a network client), an SNMP agent, a backup agent, and a System Policy Editor. The list is designed to make it easier for network administrators to manage Windows 95 clients.

Another new networking feature is the Microsoft Exchange client, intended to be able to collect mail from multiple services. Exchange, which was called InfoCenter in earlier test releases, is designed so that third-party vendors can write drivers that let it exchange mail with other mail systems. The current version includes drivers for Microsoft Mail, Microsoft's forthcoming Exchange server, Internet mail, and CompuServe. Microsoft says several other drivers are currently being written, but it hasn't yet decided which will be included in which versions of the operating system.

The Exchange client can also dial up The Microsoft Network, Microsoft's forthcoming on-line service. This is expected to be one of the first options that users of the final Windows 95 will see. One elegant feature is the ability to place a shortcut from Microsoft Network into a file or application, allowing you to go directly from an application to a support area for that application. As yet, we

Windows 95: *Going for the Logo*

By Nick Stam

What's in a name, you ask? Well, the Windows 95 name and logo on the box of a PC or peripheral will denote many things about what's inside.

Microsoft has designed a hardware certification testing program and specified minimum configurations for PCs or peripherals that want to wear the coveted Windows 95 logo. And to display the logo, a PC must be sold with Windows 95 preinstalled. (Microsoft is, however, currently developing a program for the retail market to let some hardware vendors display the "Designed for Windows 95" logo before the software ships.) The company also released a list of recommended PC and peripheral features that contribute to higher performance and ease of use.

HARDWARE CERTIFICATION

Microsoft's Hardware Compatibility Tests (HCTs) determine whether specific functions of PCs and peripherals operate correctly under Windows 95. A device must pass the HCTs under the supervision of an independent test lab or Microsoft's own Compatibility Labs.

SYSTEM REQUIREMENTS

Microsoft's *Hardware Design Guide for Windows 95* specifies the minimum required configuration for laptops, desktop PCs, and peripherals that want to claim they were "Designed for Windows 95." The book also notes recommended features for multimedia-oriented systems.

For a desktop PC to qualify for the logo, it must be at least a 386 with 4MB of RAM, a Plug and Play BIOS (though Plug and Play expansion cards are *not* required), and a standard VGA display adapter capable of 640-by-480 resolution with 256 colors. Interestingly, neither a CD-ROM drive nor audio capability is required. □

Preemptive Strikes: *Support Strategies for Windows 95*

By Robin Raskin

Historically, Microsoft hasn't exactly earned high marks from *PC Magazine* readers when it comes to supporting Windows. As the ship date for Windows 95 nears, the company wants to turn that around with a preemptive support strike involving documentation, training, and technical support. Considering that Microsoft expects to get at least three times as many support calls per day as it did at the launch of Windows 3.1, that's probably a wise move.

Software vendors, resellers, solution providers, and large sites that have bought the beta version have already received the Migration Planning Kit—a 1,500-page collection of tools and information for organizations rolling out Windows 95 upgrades. Buyers of the Windows 95 CD-ROM will also get these tools.

Microsoft has also instituted a series of Windows 95 help forums, the most ambitious of which are WinNews and TrainCast. WinNews offers documents and will be carried by most major on-line services. TrainCast is a 30-hour educational television series for information specialists and technical-support personnel.

Organizations with a satellite dish can download TrainCast free or send attendees to scheduled sessions at Microsoft Authorized Technical Education Centers worldwide. Eventually, the content for the series will be carried by the Jones Computer Network via the Mind Extension University cable television channel.

During testing of the Windows 95 Preview Program beta, calls to Microsoft Technical Support are free. After the launch, new users will get free 24-hour, 7-day-a-week support for 90 days following their purchase.

Microsoft has hired five companies with experience in the field to handle Windows 95 technical support: Digital Equipment Corp., Keane, MicroAge, Softmart, and Unisys. After your 90 days of free support are up, you'll have a variety of cost-based support plans from these providers or Microsoft.

Microsoft is also continuing its on-line support (on America Online, CompuServe, the Internet—via FTP—and GEnie), FastTips (a fax-back system of quick tips), and other databases, including the Microsoft KnowledgeBase. The Microsoft Network, scheduled to ship with Windows 95, will also be a part of the support solution, both during the preview phase and after the product launch. □

ON-LINE WINDOWS 95 INFORMATION SOURCES:

- Internet FTP: *ftp.microsoft.com/peropsys/win_news*
- World-Wide Web: *http://www.microsoft.com*
- CompuServe: GO Microsoft
- Prodigy: JUMP WINNEWS
- AOL: use keyword WINNEWS
- GEnie: download files from WinNews areas under the Windows RTC

haven't been able to test Microsoft Network extensively, although Microsoft has signed up many third-party firms to offer support through that service (for details, see "Preemptive Strikes: Support Strategies for Windows 95").

DIAL ME UP

The powerful new Dial-Up Networking option extends the network by letting a remote system act as a node on several different network types. Windows 95 can dial a Windows NT Remote Access Server, NetWare Connect, a PPP connection to Internet-access providers, or systems such as Shiva's NetModem or LanRover. Another option lets you set up your office machine as a dial-up server, so you could dial in to your desktop from your portable and use your hard disk, printer, or even network resources remotely. You could also connect via a serial or parallel port. In all these cases, your machine acts as a remote node, although Windows 95 does not provide remote-control software.

Briefcases, which can be used to store copies of files that you want to synchronize between two Windows machines automatically, are a welcome addition for those who use both mobile and desktop systems. Basic Briefcases provide only rudimentary replication—they get confused if the same document gets changed in both places—but a Briefcase API makes the system extensible.

In terms of networking, Windows 95 has a lot more features than Windows for Workgroups, Windows NT, or OS/2 Warp 3. But Warp has a more extensive list of Internet connectivity features, and IBM has plans to include features such as peer-to-peer networking, a remote-access client, and a Lotus Notes Express client in its forthcoming OS/2 Warp Connect (for details on upcoming Warp releases, see "OS/2 Warp and Beyond").

THIRD-PARTY PLANS

It's no secret that virtually all large software vendors are currently working on upgrades of their major applications to take advantage of Windows 95, including its new user-interface elements and 32-bit operation. Because Windows 95 has been delayed so often, few of these vendors are making specific plans public, but you can expect to see Windows 95 versions of many of the major applications from Adobe, Corel, Lotus, and Novell/Word-

[?]

[Features 100MHz Pentium™ processor, 1GB hard drive, 4X CD-ROM, 16MB RAM,

Why do one million people tie a piece of elastic around their ankles each year and plunge 300 feet to the earth?

It must be like the adrenaline rush of experiencing the raw power of a P5-100 Best Buy from Gateway 2000® as it rips through tons of applications simultaneously ... and like the heart-pounding excitement of getting the best value in the PC industry.

intel inside

MS® Office Professional, Bookshelf® '94 and Money for $2,899]

GATEWAY2000

800-846-2063

LEAP OF FAITH BUNGEE, INC.

We guarantee our cords won't break or your next jump is FREE!

[FEATURES 60MHz PENTIUM™ PROCESSOR, 730MB HARD DRIVE, 4X CD-ROM, 8MB RAM,

Why do 175 million people spend hours cutting along dotted lines every Sunday?

It must be like buying a P5-60 from Gateway 2000® — to get a fantastic value. There's no greater satisfaction than getting a good deal on a high-quality product. And you don't need a little piece of paper to get a remarkable value on a Gateway P5-60 — it's as simple as picking up the phone.

intel inside

MS Office Professional, Bookshelf® '94 and Money for $1,999]

GATEWAY2000

800-846-2063

[Features 730MB hard drive, 8MB EDO Performance-Enhanced Memory, 4X CD-ROM, sound card, speakers,

Why is an event where women have beards and house pets in tutus jump through rings of fire called the greatest show on earth?

It's like the Gateway P5-75 Family PC™ multimedia system — it has something for everyone! The P5-75 Family PC delivers superior performance easily running all the latest software applications. For today's family, the Gateway Family PC is the greatest show on earth!

intel inside

TelePath™ IIv fax/modem Communication Center & Family PC software for $2,499]

GATEWAY2000

800-846-2063

Gateway 2000® Family PCs™

4DX2-66 FAMILY PC

- Intel® 66MHz 486DX2 CPU*
- 8MB RAM
- 540MB 11ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- Quad-Speed CD-ROM, 16-Bit Sound Card & Altec™ ACS-5 Speakers
- TelePath™ IIv 14.4K Fax/Modem Communication Center
- 3.5" Diskette Drive
- 14" Color CrystalScan® Monitor
- 4-Bay Mini Desktop Case
- 101-Key Keyboard & MS Mouse 2.0
- MS-DOS® 6.22 & WFW 3.11
- MS Bob, Works 3.0, Encarta™ '95, Money, Cinemania® '95 & Golf
- 3-Year Limited Parts Warranty

$1699

P5-60 FAMILY PC

- Intel 60MHz Pentium™ Processor*
- 8MB RAM, 256KB Cache
- 540MB 11ms IDE Hard Drive
- PCI Enhanced IDE Interface
- 32-Bit PCI Graphics Accelerator w/ 1MB DRAM
- Quad-Speed CD-ROM, 16-Bit Sound Card & Altec ACS-5 Speakers
- TelePath IIv 14.4K Fax/Modem Communication Center
- 3.5" Diskette Drive
- 15" Vivitron™ Color Monitor
- 7-Bay Desktop Case
- 101-Key Keyboard & MS Mouse 2.0
- MS-DOS 6.22 & WFW 3.11
- MS Bob, Works 3.0, Encarta '95, Money, Cinemania '95 & Golf
- 3-Year Limited Parts Warranty

$2099

P5-75 FAMILY PC

- Intel 75MHz Pentium Processor*
- 8MB EDO Performance-Enhanced Memory
- 730MB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- 64-Bit PCI Graphics Accelerator w/ 2MB DRAM
- Quad-Speed CD-ROM, 16-Bit Sound Card & Altec ACS-5 Speakers
- TelePath IIv 14.4K Fax/Modem Communication Center
- 3.5" Diskette Drive
- 17" Vivitron Color Monitor
- 7-Bay Desktop Case
- AnyKey® Keyboard & MS Mouse 2.0
- MS-DOS 6.22 & WFW 3.11
- MS Bob, Works 3.0, Encarta '95, Money, Cinemania '95 & Golf
- 3-Year Limited Parts Warranty

$2499

P5-100 FAMILY PC

- Intel 100MHz Pentium Processor*
- 8MB RAM
- 256KB Cache
- 1GB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- 64-Bit PCI Graphics Accelerator w/ 2MB DRAM
- Quad-Speed CD-ROM, 16-Bit Sound Card & Altec ACS-5 Speakers
- TelePath IIv 14.4K Fax/Modem Communication Center
- 3.5" Diskette Drive
- 17" Vivitron Color Monitor
- 7-Bay Desktop Case
- AnyKey Keyboard & MS Mouse 2.0
- MS-DOS 6.22 & WFW 3.11
- MS Bob, Works 3.0, Encarta '95, Money, Cinemania '95 & Golf
- 3-Year Limited Parts Warranty

$2999

Professional Systems

4DX2-66

- Intel 66MHz 486DX2 CPU*
- 4MB RAM
- 340MB 13ms IDE Hard Drive
- PCI Enhanced IDE Interface
- PCI Local Bus Graphics with 1MB
- Quad-Speed CD-ROM
- 3.5" Diskette Drive
- 14" Color CrystalScan Monitor
- 4-Bay Mini Desktop Case
- 101-Key Keyboard & MS Mouse 2.0
- MS-DOS 6.22 & WFW 3.11
- MS Works 3.0 & Money 3.0
- 3-Year Limited Parts Warranty

$1299

P5-60

- Intel 60MHz Pentium Processor*
- 8MB RAM, 256KB Cache
- 730MB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- 32-Bit PCI Graphics Accelerator w/ 1MB DRAM
- Quad-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Vivitron Color Monitor
- 7-Bay Desktop Case
- 101-Key Keyboard & MS Mouse 2.0
- MS-DOS 6.22 & WFW 3.11
- MS Office Professional 4.3;** Bookshelf® '94 & Money 3.0
- 3-Year Limited Parts Warranty

P5-60 $1999
P4D-66 $1799
(66MHz 486DX2 CPU w/ 128KB cache)

P5-75

- Intel 75MHz Pentium Processor*
- 16MB EDO Performance-Enhanced Memory
- 730MB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- 32-Bit PCI Graphics Accelerator w/ 1MB DRAM
- Quad-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Vivitron Color Monitor
- 7-Bay Desktop Case
- AnyKey Keyboard & MS Mouse 2.0
- MS-DOS 6.22 & WFW 3.11
- MS Office Professional 4.3;** Bookshelf '94 & Money 3.0
- 3-Year Limited Parts Warranty

$2399

P5-100 BEST BUY

- Intel 100MHz Pentium Processor*
- 16MB RAM
- 256KB Cache
- 1GB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- 64-Bit PCI Graphics Accelerator w/ 2MB DRAM
- Quad-Speed CD-ROM
- 3.5" Diskette Drive
- 15" Vivitron Color Monitor
- 7-Bay Desktop Case
- AnyKey Keyboard & MS Mouse 2.0
- MS-DOS 6.22 & WFW 3.11
- MS Office Professional 4.3;** Bookshelf '94 and Money 3.0
- 3-Year Limited Parts Warranty

$2899

P5-100XL

- Intel 100MHz Pentium Processor*
- 16MB RAM
- 256KB Cache
- 1GB 10ms IDE Hard Drive
- PCI Enhanced IDE Interface
- ATI Mach 64 Graphics Accelerator with 2MB VRAM
- Quad-Speed CD-ROM
- 16-Bit Ensoniq® Wavetable & Altec ACS-31 Speakers w/ Subwoofer
- TelePath IIv 14.4K Fax/Modem Communication Center
- 3.5" Diskette Drive
- 17" Vivitron Color Monitor
- 9-Bay Tower Case
- AnyKey Keyboard & MS Mouse 2.0
- MS-DOS 6.22 & WFW 3.11
- MS Office Professional 4.3;** Bookshelf '94 & Money 3.0
- 3-Year Limited Parts Warranty

$3699

SERVICE & SUPPORT

- Toll-free technical support
- 30-day money-back guarantee
- Three-year limited warranty on parts for desktop PCs & monitors (Call or write for a free copy)
- On-site service available in most U.S., Canadian & some international locations
- Toll-free phone service & support for Canadian & Puerto Rican customers
- Convenient door-to-door delivery plan for Canadian customers

***MS Office Professional 4.3 includes MS Word, Excel, PowerPoint® presentation graphics program, and Access® database.*

All systems include Corel Photo CD Sampler Special Edition.

Printed on recycled paper with soy inks.

Toll free from Canada
800-846-3609

Toll free from Puerto Rico
800-846-3613

GATEWAY2000
"You've got a friend in the business."®

8 0 0 - 8 4 6 - 2 0 6 3

*Intel Verified: Upgradable

intel inside

610 Gateway Drive • P.O. Box 2000 • N. Sioux City, SD 57049-2000 • Phone 605-232-2000 • TDD 800-846-1778 • Fax 605-232-2023 • FaxBack 800-846-4526
International FaxBack Access 605-232-2561 • Component Add-On Sales 800-846-2080 • Sales Hours: 7am-10pm Weekdays, 9am-4pm Saturdays (CDT)

[!]

Exciting values from Gateway 2000.® Peripherals and software sold only with the purchase of a system.

Communications & Storage

New TelePath™ IIv Fax/Modem Communication Center

Revolutionize your communication needs with the TelePath IIv Fax/Modem Communication Center. Internal fax/modem, 14,400bps modem, V.32bis, with 14,400bps fax capability. The FaxWorks Communication Center sends and receives both faxes and voice messages. Other features include fax editing, forwarding and scheduling, plus remote access to voice messages and faxes. Includes a CompuServe® trial membership. **$99**

Colorado Memory Systems® TBU

250MB internal tape backup unit copies up to 9.5MB per minute. Comes with MS Windows and DOS® software, one tape and cable. **$149**

Multimedia

Audio Multimedia Kit

Here's everything you need to add multimedia to a Gateway PC.

- Gateway 2000 16-bit CD-quality sound card, compatible with Sound Blaster™ cards, with MIDI/game port, mic in, stereo line in/out
- 2 Altec ACS-5 speakers

$99 *(with system purchase)*

Wavetable Audio Multimedia Kit

Once you've heard wavetable audio, basic audio will never do!

- Ensoniq® Soundscape™ 16-bit wavetable sound card, MT-32 and FM mode compatible. Supports most software for popular sound cards and standards including General MIDI, Sound Blaster, AdLib, Roland MPU 401, MS Windows™ Sound Sytem and MT 32
- New Altec Lansing ACS-31 three-piece speaker system
- Blue Ribbon Sound Works' SuperJAM! jr. software

$209 *(with system purchase)*
$110 *(upgrade from systems with 16-bit sound card and Altec speakers)*

Kid's Backpack™

Seven exciting software applications designed specifically for kids. Includes Sesame Street® Numbers; My First Incredible, Amazing Dictionary; The Cat Came Back; The Yukon Trail™; Keroppi Day Hopper; Math Blaster®: In Search of Spot; and Sing-Along Kids™. Also includes a 20-disk storage rack and microphone. **$99**

Flight Pack

Seven top-of-the-line flight CDs. Includes TFX™: Tactical Fighter Experiment, Aces Over Europe, Maximum Comanche®, Strike Commander, Privateer, Wing Commander™ Armada and Warplanes. You also get a joystick and 20-disk storage rack. **$99**

Ask about our other software bundles including the Sports Bundle!

Monitors

Gateway 17-Inch Vivitron™ Color Monitor

Non-interlaced color monitor using Sony® Trinitron® tube technology, capable of 1280 x 1024 resolution in non-interlaced mode, .26 dot pitch.
Upgrade from a 14-inch CrystalScan® 1024NI monitor **$360**
Upgrade from a 15-inch Vivitron monitor **$260**
(Upgrade prices good only at the time of system purchase.)

Printers

Hewlett®-Packard 4L LaserJet Printer

A full-featured 300dpi printer loaded with enhanced PCL 5 and 26 scaleable typefaces with 1MB standard HP Memory Enhancement Technology.
Includes parallel cable. **$559**

Epson® Stylus™ Color Ink Jet Printer

Features 360dpi high-quality print resolution and 720dpi for more brilliant colors on specially coated paper. Exclusive technology produces a precise dot.
Includes parallel cable. **$529**

Hewlett-Packard Deskjet 540 Inkjet Printer

Features clear, sharp 600 x 300dpi black printing on plain paper with a variety of built-in typefaces. Color option also available. Includes parallel cables.
$299 (w/ out color) **$339** (w/ color)

Epson ActionLaser 1500 Laser Printer

A high-quality personal laser printer for users who require superior outputs! Features 300 x 300dpi, 14 resident fonts, 13 scaleable to any size; 1MB memory expandable to 5MB and a versatile, high-capacity 150-sheet input tray. Includes parallel cable. **$479**

Call for other printer options.

Networking

3Com® Ethernet Adapters

Ultra high-performance 16-bit Ethernet cards from the world leader in Ethernet technology.
16-bit Triple Media Card supports BNC, AUI and Twisted Pair media **$109**
16-bit Twisted Pair Card **$89**

SMC® PCI Ethernet Adapter

Supports both Twisted Pair and BNC Media **$149**

National Semiconductor Ethernet Adapters

Infomover™ brand NE2000plus™ Ethernet cards
Triple Media Card w/ 25-foot coax cable **$89**
Twisted Pair only Card **$69**

Token Ring Adapter

16-bit Token Ring card **$329**

Gateway accepts most major credit cards and C.O.D. terms, with net 30-day terms and leasing options available to qualified commercial customers. You can also apply for the Gateway 2000 DuoLine™ MasterCard® card, issued by Dial National Bank, Des Moines, Iowa.

Call the Gateway 2000 special component add-ons division at 800-846-2080 for our complete line of extras for Gateway customers. Sales hours: 7am-10pm Weekdays.

GATEWAY2000

"You've got a friend in the business."®

8 0 0 - 8 4 6 - 2 0 6 3

© 1995 Gateway 2000, Inc. Gateway 2000, AnyKey, CrystalScan, black-and-white spot design, "G" logo and "You've got a friend in the business" slogan are registered trademarks, and DuoLine, Family PC, Vivitron and TelePath are trademarks of Gateway 2000, Inc. The Intel Inside Logo, Intel, Pentium and OverDrive are trademarks or registered trademarks of Intel Corporation. Trinitron is a registered trademark of Sony corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. Monitors' diagonal measurements indicate the size of the cathode-ray tube. All prices and configurations are subject to change without notice or obligation. Prices do not include shipping or applicable sales tax.

Windows 95: *New Software*

By Michael J. Miller

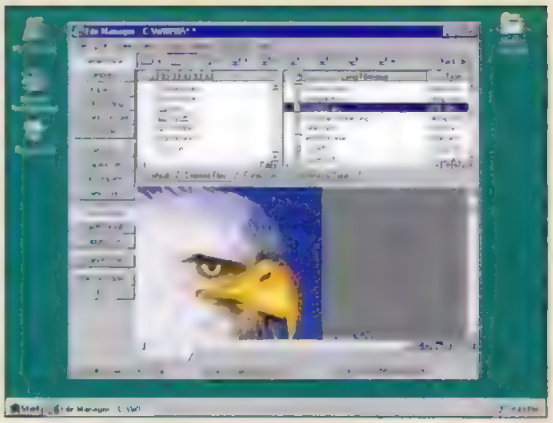
It seems as if just about every significant vendor of personal computer software is currently working on new releases of its major products designed specifically for Windows 95. From a technical standpoint, they see much to gain. By building new versions, they can leverage Windows 95's advanced features such as 32-bit linear addressing and multiple program threads or at least the new user interface and the new, more powerful common dialog boxes.

From a practical business standpoint, there's another reason why so many vendors are frantically writing code for Windows 95. They know from experience that many computer users look to buy new applications or new utilities when they update their operating system.

APPLICATION SOFTWARE

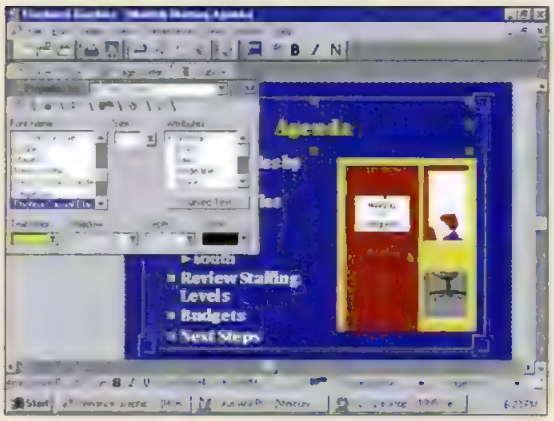
On the application side of the software business, just about everyone wants into the act. Most companies are now quietly showing Windows 95 beta versions of their wares, but several upgrades have been publicly announced. For instance, Lotus has shown an early version of its Freelance Graphics that will include such things as the LotusScript cross-application macro language, an Infobox for changing the properties of different parts of the system, and several changes in the user interface. Expect similar changes in other parts of Lotus's SmartSuite.

Similarly, Novell plans to add multithreading to core features (such as printing and spell-checking) in WordPerfect and, later, to other parts of its PerfectOffice suite of applications.



Symantec's new Norton Navigator is slated to include a replacement for Windows 95's Explorer.

Microsoft itself has been relatively quiet about upgrades to its Microsoft Office applications, but you can expect the minimum of a move to 32-bit applications with support for the new common dialogs. Note that Microsoft Word and Excel for Windows NT will already run as native applications under Windows 95, although they are visually identical to the existing Windows 3.1 versions. At press time, there have been some unconfirmed rumors that Microsoft may even include a locked version of Microsoft Office on the Windows 95 CD.



Lotus is already showing an early beta version of its Freelance Graphics for Windows 95.

Corel Corp. has had to delay its CorelDRAW 6.0, which was designed for Windows 95, because of delays to the operating system. And Corel is also working on a new office suite for this environment.

A few smaller vendors have also shown early versions of their Windows 95 applications. These include Micrografx's Picture Publisher, an image-editing program; Shapeware's Visio, a drag-and-drop drawing program; Delrina's WinFax PRO, which adds voice messaging capability; and NCSA's Mosaic World-Wide Web browser.

NEW UTILITIES

A number of utility vendors are also looking forward to Windows 95. This is despite the fact that the new operating system offers many features (an object-oriented desktop, for example) that used to be available only through add-on utilities.

The largest utility company, Symantec, has several new Windows 95 products in the works. The Norton Utilities for Windows 95 is out in a Preview Edition designed to be used with the Microsoft Windows 95 Preview Program beta. This package offers many of Norton's traditional features and some updates of its classic data-recovery capabilities. The latter include UnErase, here implemented using a Wizard-style interface; an improved Recycle Bin, making it easier to retrieve deleted files; a rescue disk feature for creating floppy disks with important system files; and a new Space Wizard for finding duplicate files on a hard disk.

To give you more information about your system, the new version of

The Norton Utilities will also include a much more graphical System Information screen, as well as a new System Doctor for tracking disk space, disk fragmentation, and CPU and memory usage. Another addition is a new version of the SpeedDisk disk cache.

McAfee Associates, Symantec, and other utility vendors are preparing versions of their antivirus programs, as an antivirus scanner is no longer a built-in feature of the operating system. And though Windows 95 includes a disk-compression utility called DriveSpace, you can expect Stac Electronics to update its Stacker to take advantage of things such as long filenames and Plug and Play.

NEW INTERFACE

One of the most important changes that Windows 95 brings to the user interface is a new set of common dialogs. These are the standard boxes that programs use for tasks like Open, Save, and Save As, as well as for changing font settings and performing other common functions. Windows programs don't have to use Windows' common dialogs (in the past, some of Microsoft's own applications haven't), but the boxes are always available for any program to call.

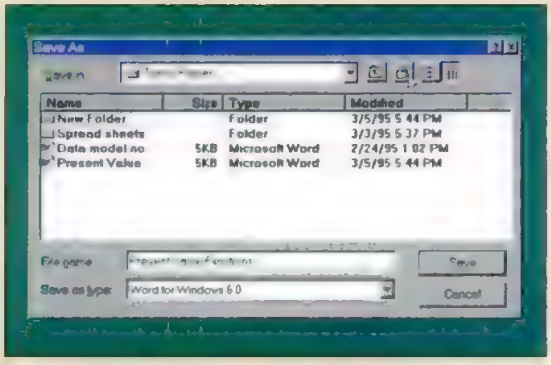
In addition to a more user-friendly layout, the new Windows 95 common dialogs offer important file management features that were unknown in Windows 3.1. These features include the ability to work directly with folders (rather than with physical paths) and to use long filenames. You'll also be able to create new folders on the fly without having to exit a dialog.

Though these features cover some of the ground that Windows 3.1 left to add-on utilities, you can still expect to see a number of utility vendors offering their own user-interface enhancements and extensions to those in Windows 95. The list of contenders will include Symantec's Norton Navigator (a new product similar to a next-generation XTreeGold for Windows) and Dashboard (originally from Hewlett-Packard, recently acquired by Starfish Software).

Systems Compatibility Corp., which supplies the basic viewers that come with Windows 95, will offer a utility called Outside In/for Windows 95 that offers hundreds of additional file viewers, as well as the ability to print a document from a view.

BIG OPPORTUNITY

Clearly, Windows 95 will bring big changes to the software industry and will pose a special challenge for vendors of system utilities and shell enhancements. At the same time, it spells a big opportunity. Even the most conservative estimates see millions of users moving to the new platform this year and as much as half the Windows installed base switching over in 1996. Many of those people will be making software upgrades that are currently on hold as the industry waits for Windows 95 to ship.



New common dialogs that can handle folders and long filenames will be available for all Windows 95 applications.

Yes, we'll also go on using some 16-bit applications for quite some time (although they may well start to look and feel increasingly old-fashioned). But not since the appearance of Windows 3.0 has there been such a compelling reason for so many people to evaluate new software. □

Perfect. You can also expect most of these firms to wait at least a few weeks after Windows 95 ships to test compatibility with the final version.

Windows 95 includes a number of features that have been sold in the past as standalone utilities—including disk scanning, remote-node software, and a disk compression utility. But virtually all of the major utility vendors, including Helix, Qualitas, Quarterdeck, Stac, and Symantec, are working on upgrades of their own. For instance, many of The Norton Desktop's current features will be redundant under Windows 95, but Symantec is working on a new version of The Norton Utilities and on Norton Navigator, a new file management utility. Interestingly, some utilities that were part of DOS 6.0, such as an antivirus utility, are not a part of Windows 95 (Symantec also plans to ship its Norton AntiVirus for Windows 95).

On the hardware front, most PC vendors tell us they have plans to preload Windows 95 on the bulk of their systems as soon as it is available, although many say they will offer alternatives as well. For instance, Compaq announced that Windows 95 will be its "preferred operating system" but said it would continue to offer Windows 3.1 to customers who ask for it.

HARDWARE REQUIREMENTS

If you already have a system, you'll wonder whether Windows 95 will run on it. The first issue is hardware requirements. Microsoft says that a Windows 95 system requires at least a 386DX processor with 4MB of RAM, but it recommends a 33-MHz 486 with 8MB of RAM. The latter configuration seems like a reasonable minimum to us.

Our preliminary tests on prerelease code show that Windows 95 runs somewhat slower than Windows for Workgroups 3.11 on a 4MB configuration (and probably too slow for most users). But on an 8MB or 16MB system, it performed as fast as or slightly faster than WfWG 3.11, with more marked speed increases noticeable on faster systems (for details, see "The Microsoft Windows 95 Preview Program: Previewing Performance"). As always, it depends on what you are doing. In general, we found Windows 95 to be faster at graph-

Generation X-treme

Introducing NEW Austin PowerPLUS™ Desktop Systems:

PowerPLUS-120

EXTREME PERFORMANCE!

- 120MHz Intel® Pentium™ Processor
- 16MB RAM
- 256KB Burst L2 Cache
- 64-bit PCI Video Accelerator - 2MB
- Two 32-Bit PCI, Four 16-Bit, and 1 ISA-PCI Expansion Slots
- 3.5" 1.44MB Diskette Drive
- MS-DOS 6.22, Windows for Workgroups 3.11
- 101-Key Keyboard & MS Mouse
- Energy-Star Compliant
- Desktop or Mini-Tower Chassis

A New Value Equation:

We've rewritten the book on value, not just because we offer low prices on the hottest desktop and portable PC systems, but also because with an average two-minute response time, our technical support and customer service are a cut or two above the competition.

A PC with all the extras. . . Once you've chosen your system, we'll help you maximize your productivity, with the most popular peripherals and software that transform a basic computer into a full-featured electronic office. We know that your work demands more from you. That's why we want you to expect more from us.

Ask About AUSTIN EXTREME SERVICE

No Speed Limits

It's a new generation of processing speed and data-moving power – the Austin PowerPLUS 120, with the fastest Pentium architecture available, supporting up to 100MB/sec PCI combined data streaming. Fire it up! As the surrounding distractions fade into the background, this system's performance keeps you focused on the sharp screen image. Intense! You won't waste any time with this level of horsepower.

Mondo Multimedia

We won't mince words – the Ultimate Multimedia machine has it all. The Quad-speed CD-ROM drive, the sound card, the big (BIG) hard drive – everything you need, installed and ready to run. But stop reading about it – get your hands on one. Call now – *we'll have one warmed up for you.*

Business Workstation with Microsoft® Office Standard 4.2 — $3,299

- 730MB IDE Hard Drive
- 15".28mm Non-Interlaced Monitor
- Microsoft Office Standard 4.2: Preloaded Excel v5.0, Word v6.0, PowerPoint v4.0, Mail v3.2
- **Business Lease: $118/mo.**

Ultimate Multimedia — $3,699

- 1.275 Gigabyte IDE Hard Drive
- 4X IDE CD-ROM Drive, 16-Bit Audio Card, and Stereo Speakers
- 17".26mm Non-Interlaced Monitor
- **Business Lease: $132/mo.**

Take a Wild Ride with a New PowerPLUS System from Austin!

It's a Price/Performance Experience That Makes Your Head Spin

Quick-Ship

PowerPLUS-100

- 100MHz Intel Pentium Processor
- 256KB Burst L2 Cache
- 64-Bit PCI Video Accelerator – 2MB
- 3.5" 1.44MB Diskette Drive
- MS-DOS 6.22, Windows for Workgroups 3.11
- 101-Key Keyboard & MS Mouse
- Energy-Star Compliant
- Desktop or Mini-Tower Chassis

Business Workstation with Microsoft Office Standard 4.2 — $2,599

- 8MB RAM
- 850MB Bus Mastering IDE HD
- 15".28mm Non-Interlaced Monitor
- Microsoft Office Standard 4.2: Preloaded Excel v5.0, Word v6.0, PowerPoint v4.0, Mail v3.2
- Business Lease: $99/mo.

Multimedia Computer — $2,999

- 16MB RAM
- 1.275GB Bus-Mastering IDE HD
- 4X IDE CD-ROM Drive, 16-Bit Audio Card, and Stereo Speakers
- 15".28mm Non-Interlaced Monitor
- Business Lease: $114/mo.

PowerPLUS-75

- 75MHz Intel Pentium Processor
- 8MB Extended Data Output (EDO) RAM
- 64-Bit PCI Video Accelerator – 1MB
- 3.5" 1.44MB Diskette Drive
- MS-DOS 6.22, Windows for Workgroups 3.11
- 101-Key Keyboard & MS Mouse
- Energy-Star Compliant
- Desktop or Mini-Tower Chassis

Business Workstation — $1,799

- 540MB Bus Mastering IDE HD
- 14".28mm Non-Interlaced Monitor
- Business Lease: $69/mo.

Multimedia Computer (Quick Ship!) — $2,199

- 850MB Bus Mastering IDE HD
- 4X IDE CD-ROM Drive, 16-Bit Audio Card, and Stereo Speakers
- 15".28mm Non-Interlaced Monitor
- Business Lease: $80/mo.

Premier PCI 466

- 66MHz Intel 486DX2 Processor
- 8MB RAM, 128K L2 Cache
- PCI Video Accelerator – 1MB
- 3.5" 1.44MB Diskette Drive
- MS-DOS 6.22, Windows for Workgroups 3.11
- 101-Key Keyboard & MS Mouse
- Verified Pentium Upgradable
- Energy-Star Compliant
- Desktop or Mini-Tower Chassis

Business Workstation — $1,499

- 420MB IDE Hard Drive
- 14".28mm Non-Interlaced Monitor
- Business Lease: $57/mo.

Multimedia Computer — $1,699

- 540MB IDE Hard Drive
- 4X IDE CD-ROM Drive, 16-Bit Audio Card, and Stereo Speakers
- 14".28mm Non-Interlaced Monitor
- Business Lease: $65/mo.

Custom Add-Ons

Bundled with On-Line Services: Prodigy, America Online, CompuServe®, ImagiNation Network, Official Airline Guide, Wealth Builder™, Reuters Money Network, NetCruiser

14.4Kbps Internal Fax/Modem ..... add $59

28.8Kbps Internal Fax/Modem ..... add $159

Extras & Upgrades

8MB to 16MB RAM Upgrade ..... add $300

15" to 17" .26mm Digital Monitor ..... add $375

250MB Tape Drive ..... add $169

Tower Chassis ..... add $50

Ask About Systems Preloaded with Microsoft Office 4.2 or Office Pro 4.3!

To Place Your Order

Call Now.

800-483-9938

AUSTIN™

A Division of IPC Technologies, Inc.

10300 Metric Boulevard
Austin, Texas 78758
512-339-3500 • FAX 512-454-1357

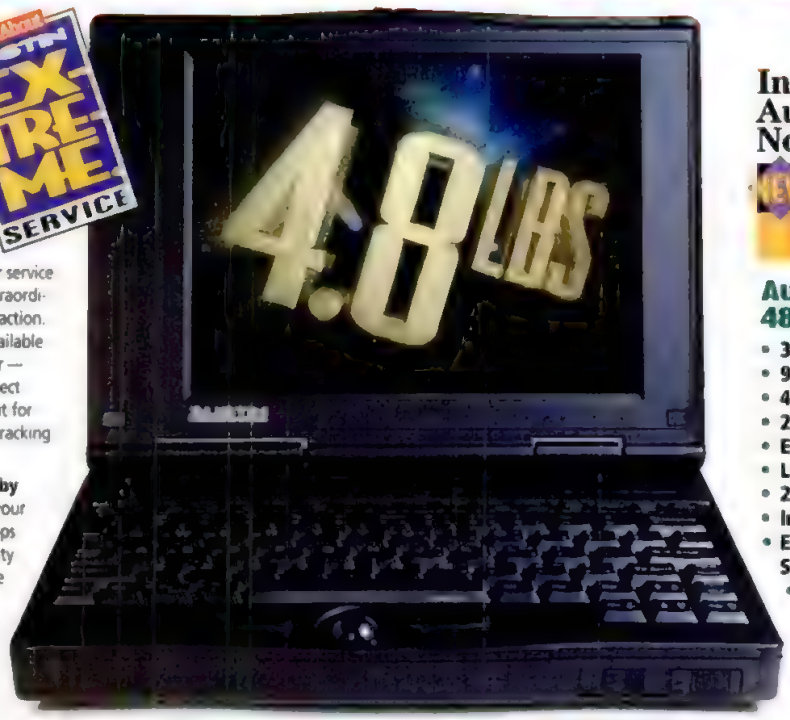
Government Sales: 800-833-4472
Fortune 1000 Sales: 800-622-5506
Canadian Sales: 800-338-1565
International Sales: 512-339-3547

For More Information By Fax: 800-341-7500

Ad Code: 9938

©1995 Austin Direct. All rights reserved. The Intel Inside logo is a registered trademark of Intel Corp. Intel Pentium, DX4, DX2, DX are trademarks of Intel Corp. Microsoft is a registered trademark and Windows and the Windows logo are trademarks of Microsoft Corp. All other company names and products are trademarks or registered trademarks of their respective owners. The above are special promotional prices. Prices and specifications are subject to change without notice. We are not responsible for errors in typography and photography. Actual configuration shipped may vary from products shown. *Business Lease term reflects 36-month contract.

LiteSpeed Traveller



Setting a New Standard:

You can expect more from Austin because our customer service and technical support teams set extraordinarily high standards for your satisfaction. If you have any questions, we're available all the time — seven by twenty-four — toll-free. For life. And you can connect to our BBS support that's convenient for downloading utility upgrades and tracking technical data.

All Austin systems are covered by a strong warranty that protects your technology investment. Our desktops are covered by a three-year warranty (comprehensive notebook coverage is one year), and — of course — there's the thirty-day, money-back guarantee. Call Austin. It's time you got used to a higher standard.

Introducing NEW Austin StepLite™ Notebook Systems:

NEW Austin StepLite™

Austin StepLite 486SX-33 $1,499

- 33MHz Intel™ 486SX Processor
- 9.5" Monochrome Display
- 4MB RAM (expandable to 20MB)
- 262MB IDE Drive (user replaceable)
- External 3.5" 1.44MB FDD
- Local Bus IDE
- 2 Type II or 1 Type III PCMCIA Slots
- Integrated Pointing Device
- EPP/ECP Parallel, 16650 High Speed Serial, Keyboard, VGA Ports
- Advanced Power Management
- Weight w/ Battery Only 4.8 lbs.
- Business Lease: $57/mo.

Austin StepLite 486DX2-50 $1,999

- 50MHz Intel 486DX2 Processor
- 9.5" STN Display
- 4MB RAM / 262MB Hard Drive
- Business Lease: $76/mo.

Austin StepLite 486DX4-75 $2,149

- 75MHz Intel 486DX4 Processor
- 9.5" STN Display
- 4MB RAM / 340MB Hard Drive
- Business Lease: $82/mo.

More to Meet Your Eye

The Austin StepLite is a true road warrior hidden in a tough, 4.8-pound package. Even though it's lighter than most notebooks, the StepLite still delivers DX4 power, a full-sized keyboard, convenient trackball, and PCMCIA expansion. And the StepLite outperforms puny subnotebooks! For example, the 9.5" screen is 21 percent larger than the Toshiba Portégé display. To withstand the hard knocks that come with a heavy travel schedule, the StepLite's case is 50% thicker than the competition's.

Raise Your Hourly Rate

The StepLite extends battery life with complete APM-compliance, and with the advanced power-management features enabled, you'll wind down long before the StepLite does. StepLite: It's another way Austin makes your work easier – *at home or on the road.*

The World of IPC Technologies:

Because Austin is a division of IPC Technologies, you tap into the many benefits of a diversified global organization with interests in multimedia products, desktop PCs, network servers, and point-of-sale systems. As your needs grow and change, you can stay with Austin and IPC Technologies.

IPC

IPC TECHNOLOGIES INC.

Stunning Color and High-Octane Performance

These Notebooks Mean Rave Reviews for Your Traveling Show

Built for Business
With the Austin Business Audio notebook, you'll have the power of sound in all your presentations.

Extreme Screen
Enhance life on the road with big-screen excitement: choose the Austin Vista and its 11.3-inch display.

Austin Notebooks — Business Audio — NEW Austin Vista™ — MS Office Bundles

- Intel 486SX, DX2, DX4 Processors
- 262MB to 810MB IDE Drive – User Replaceable
- 3.5" 1.44MB Diskette Drive
- Local Bus IDE
- 2 Type II or 1 Type III PCMCIA Slots
- Integrated Pointing Device
- EPP/ECP Parallel, 16650 High Speed Serial, Keyboard, VGA Ports
- Advanced Power Management
- 16-Bit Business Audio Features: Built-in Microphone and Speaker, External Jacks for Line-In/Line-Out
- Microsoft Windows Sound System Software, Cylogic Voice User and External Microphone for True Speech Recognition.
- Custom Configurations Available

Ships to You Within 48 Hours! Call and Ask About Other QuickShip Configurations.
(Applies to selected systems only, with approved credit.)

Business Audio 486DX2-50 — $1,999

- 50HMz Intel 486DX2 Processor
- 9.5" DSTN Display
- 4MB RAM (expandable to 32MB)
- 262MB IDE Drive
- Local Bus IDE
- 2 Type II or 1 Type III PCMCIA Slots
- Integrated Pointing Device
- EPP/ECP Parallel, 16650 High Speed Serial, Keyboard, VGA Ports
- Business Audio. Voice Enabled
- Weight with Battery: 6.3 lbs.
- **Business Lease: $77/mo.**

Business Audio 486DX4-100 — $3,669

- 100MHz Intel 486DX4 Processor
- 9.5" TFT Active Color Display
- 8MB RAM (expandable to 32MB)
- 810MB Hard Drive
- Business Audio, Voice Enabled
- **14.4K Internal Fax/Modem**
- Weight with Battery: 6.3 lbs.
- **Business Lease: $132/mo.**

Feb 95

Austin Vista 486DX4-75 — $2,549

- 75MHz Intel 486DX4 Processor
- 11.3" DSTN Display
- 8MB RAM (expandable to 28MB)
- 340MB Hard Drive
- Local Bus IDE
- 2 Type II or 1 Type III PCMCIA Slots
- Integrated Pointing Device
- EPP/ECP Parallel, 16650 High Speed Serial, Keyboard, VGA Ports
- Business Audio, Voice Enabled
- Weight with Battery: 6.5 lbs.
- **Business Lease: $97/mo.**

Austin Vista 486DX4-100 — $3,879

- 100MHz Intel 486DX4 Processor
- 10.4" TFT Active Color Display
- 8MB RAM (expandable to 28MB)
- 810MB Hard Drive
- Business Audio, Voice Enabled
- Weight with Battery: 6.5 lbs.
- **Business Lease: $139/mo.**

Business Audio 486DX4-75 with Microsoft Office Standard 4.2 — $2,869

- 75MHz Intel 486DX4 Processor
- 9.5" DSTN Display
- 8MB RAM (expandable to 32MB)
- 810MB Hard Drive
- Business Audio, Voice Enabled
- Weight with Battery: 6.3 lbs.
- **Microsoft Office 4.2 Preloaded**
- **Business Lease: $109/mo.**

Best Buy!

Austin Vista 486DX4-100 with Microsoft Office Standard 4.2 — $3,169

- 100MHz Intel 486DX4 Processor
- 11.3" DSTN Display
- 8MB RAM (expandable to 28MB)
- 810MB Hard Drive
- Business Audio, Voice Enabled
- Weight with Battery: 6.5 lbs.
- **Microsoft Office 4.2 Preloaded**
- **Business Lease: $114/mo.**

Ask About Notebook Systems Preloaded with Microsoft Office 4.2!

To Place Your Order
Call Now.
800-483-9938

intel inside

AUSTIN
A Division of IPC Technologies, Inc.

10300 Metric Boulevard
Austin, Texas 78758
512-339-3500 • FAX 512-454-1357

Government Sales: 800-833-4472
Fortune 1000 Sales: 800-622-5506
Canadian Sales: 800-338-1565
International Sales: 512-339-3547

For More Information By Fax: 800-341-7500

Ad Code: 9938

©1995 Austin Direct. All rights reserved. The Intel Inside logo is a registered trademark of Intel Corp. Intel Pentium, DX4, DX2, DX are trademarks of Intel Corp. Microsoft is a registered trademark and Windows and the Windows logo are trademarks of Microsoft Corp. All other company names and products are trademarks or registered trademarks of their respective owners. The above are special promotional prices. Prices and specifications are subject to change without notice. We are not responsible for errors in typography and photography. Actual configuration shipped may vary from products shown. *Business Lease term reflects 36-month contract.

CIRCLE 012 ON READER SERVICE CARD

STILL TRYING TO FIGURE OUT WHO HAS THE BEST FLOWCHARTING SOFTWARE FOR WINDOWS?

VISIO IS THE *BEST-SELLING* PRODUCT IN THE CATEGORY. AND THAT'S JUST THE *TIP* OF THE ICEBERG.

There you sit, wrestling with yet another flowchart using that supposedly simple software program. Meanwhile, a little voice in the back of your head is saying "There's got to be a better way!" There is. It's called Visio 3.0.

With Visio® software, you can effortlessly create anything from flowcharts to marketing diagrams, timelines, org charts, and office layouts. You get the picture. And so have a lot of other companies who have standardized on Visio. They agree Visio is simply the best.

- Best-selling product in its category
- Best integration with Windows® software
- Award-winning: Win 100 Award, PC Computing MVP Award, and Home Office Computing Award

Buy Visio through one of the resellers below and you'll receive a coupon for our FREE Visio FlowCharter Converter Kit ($39 value) that converts CorelFlow and ABC FlowCharter drawings into smart Visio diagrams. Offer expires June 30, 1995.

COMPUTER Artist (800) 843-2489

Softmart (800) 328-1319

COMPUSA (800) 278-1685

CORPORATE SOFTWARE (800) 718-4698

EGGHEAD SOFTWARE (800) 344-4323

© 1995 Shapeware Corp. All trademarks referenced herein are held by their respective companies. All rights reserved.

ics but slower at disk operations than WfWG 3.11.

We recommend 16MB of RAM, particularly if you plan to run multiple applications. In general, Windows 95 system requirements appear to be greater than those of Windows 3.1, about on a par with OS/2 Warp 3's, and well below those of Windows NT 3.5. (For details, refer to "OS/2 Warp 3 and Windows NT 3.5: The Future's Here Today," December 20, 1994).

Windows 95 takes up about 40MB of hard disk space, some 15MB more than Windows 3.1. Applications just seem to get larger, too, so you probably should have at least a 250MB hard disk (before using any compression utility).

In order to match the popularity of Windows 3.1, the final release will have to deliver what the current beta can only promise.

COMPATIBILITY

The biggest issue with any new or upgraded operating system is backward compatibility with existing hardware and software. Indeed, compatibility problems have caused most of this year's delays of Windows 95.

The task of ensuring complete compatibility with every available driver, peripheral, and application is daunting and probably impossible, as demonstrated by the problems faced by Windows NT and OS/2 users. (Even though OS/2 has been through several releases and is now extremely compatible with Windows applications and machines, users still run into some compatibility and installation problems.) Some products and combinations will undoubtedly cause problems for Windows 95 users as well.

As Windows 95 is still in testing, it's too early to evaluate compatibility fully. In fact, we won't really know for sure until the operating system is in the hands of millions of users, each with unique hardware and software combinations.

Our preliminary tests show good but not perfect compatibility. Most applications ran well on our configurations, including the 13 top-selling Windows applications that are part of our Winstone 95 benchmark test suite and several more challenging ones, such as id Software's DOOM, Brøderbund's Myst, and Traveling Software's Laplink V for DOS. But we did run into difficulties with Lotus Freelance Graphics for Windows, and we were unable to get Windows 95 to work properly with PCMCIA modems on the Hewlett-Packard OmniBook 600. We also ran into occasional TCP/IP conflicts. We were most likely to run into system crashes when working with existing device drivers that run in real mode.

THE BOTTOM LINE

For many people, the choice of moving to Windows 95 will be made for them by their hardware vendors, which appear to be getting on the bandwagon in ever larger numbers. Windows 95 is also receiving broad support from the bulk of software vendors, although we expect many to support and enhance their applications for Windows 3.1, as well.

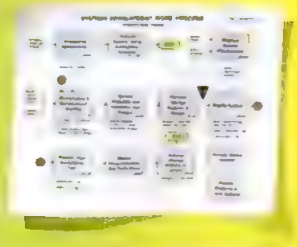
On the whole, in terms of performance and general architecture, Windows 95 promises to finish about even with OS/2 Warp; it is considerably more powerful and sophisticated than Windows 3.1. Not surprisingly, it beats Windows NT's performance, but it lacks many of Windows NT's sophisticated features such as symmetric multiprocessing support, advanced task protection, and C2-level security. At this stage, compatibility remains an open question; the early indications are good.

The sheer size of the Windows installed base and the huge amount of Windows software clearly elevate the release of Windows 95 to a defining moment. It's also clear that, despite many built-in compromises, Windows 95 marks a major advance over its predecessor in terms of user interface, utilities, architecture, configuration, and networking. But Windows 95 is not your only choice. In order to match the popularity of Windows 3.1, the final release of Windows 95 will have to deliver what the current beta can only promise. □

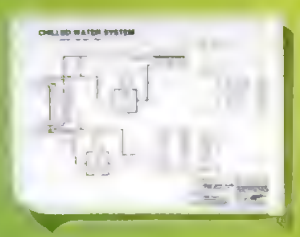
IF YOU WANT AN EASIER, FASTER, MORE EFFICIENT WAY OF WORKING, GET VISIO 3.0.

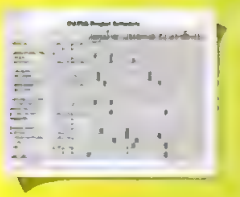
MOTOROLA MOTSAN "Visio® allows the elimination of more than five software products. Visio should be a standard utility on all Windows™-based PCs because of its ability to provide double-digit productivity improvements." *Dave Crumpton (Director of MOTsan SE)*

FLUOR DANIEL "We standardized on Visio for all work flow diagrams–company wide. Visio is the easiest way to deliver even the most complicated drawings." *Ken Cain (Director of Information Services)*



JOHNSON CONTROLS "Visio makes it possible to move from a complex world of CAD to a much simpler world of Windows desktop drawing tools. We went from 4000 CAD symbols in AutoCAD® down to 200 Visio SmartShapes®—this simplicity is driving a great deal of value. We've reduced our engineering cost significantly." *Bill Huth (Manager Field Design Engineering)*





MOBIL "I recommend Visio to anybody who needs to express ideas or get decisions made in a short period of time. One Visio drawing tells the story that 100 pages of text do not." *Wayne Kendrick (System Analyst)*

CHRYSLER "At Chrysler, Visio lets us annotate and view CAD drawings which formerly were annotated in an unfriendly fashion on a mainframe. Visio's modern interface makes using PC-based graphics easy for everyone." *Robert Levy (System Analyst)*

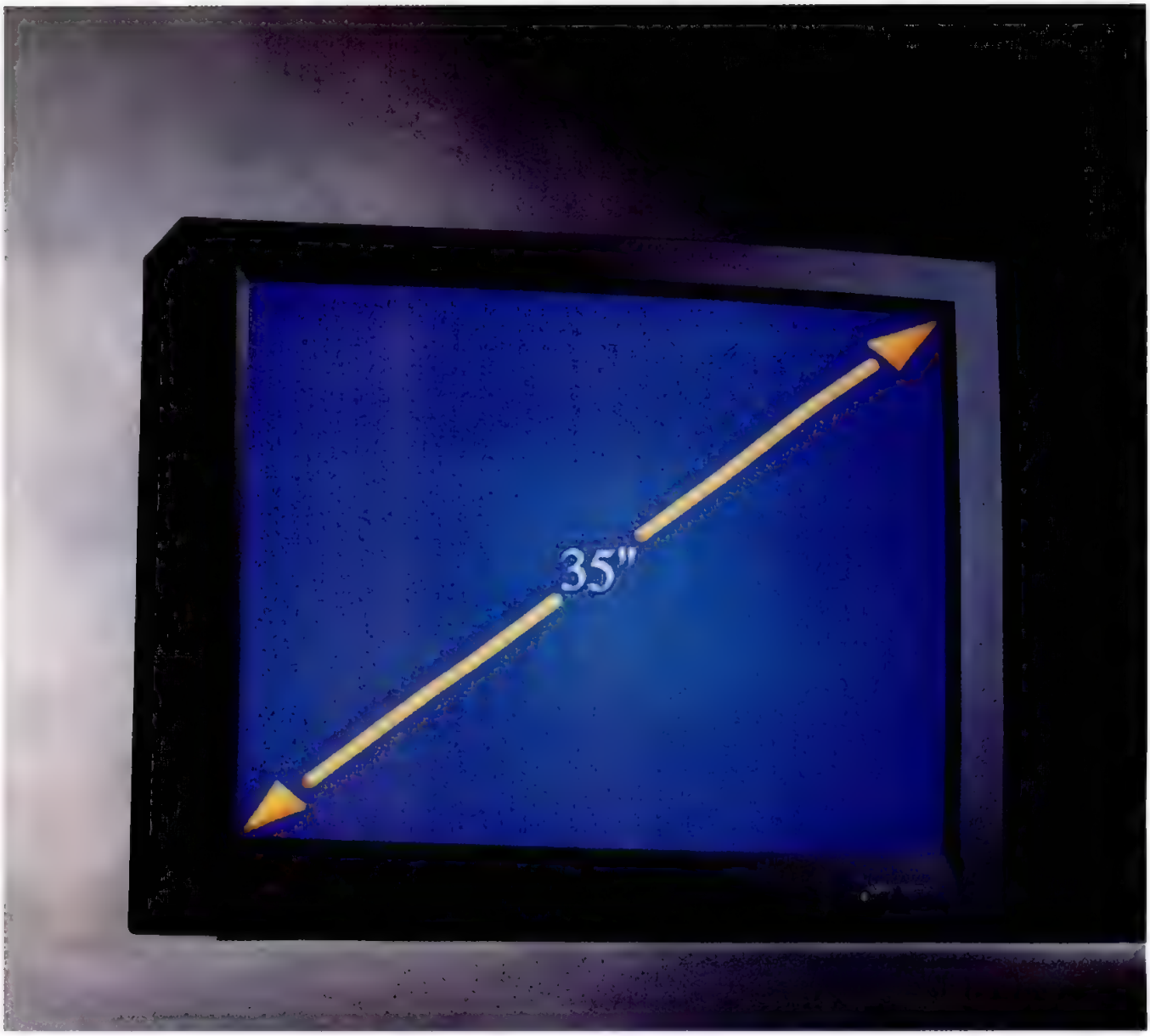
SMITH BARNEY "Never seen a product make people so productive, so quickly." *Doug MacLean (Senior LAN Administrator)*

Visio is a mere $129. To order, call (800) 457-3335, ext. B33. For information on Organization Licensing programs or to qualify for a Visio Evaluators Kit call 206-521-4500.

VISIO
SMARTSHAPES® TECHNOLOGY

© 1995 Shapeware Corp. All trademarks referenced herein are held by their respective companies. All rights reserved.

Business drawing for people whose business isn't drawing.™



IT IS THE YARDSTICK BY WHICH ALL OTHER MONITORS WILL BE MEASURED. (GIVE OR TAKE AN INCH.)

Presenting the new NEC MultiSync® XP37™. It's the biggest, most impressive member of a monitor family that has set the standard for image quality, compatibility, and uncompromising reliability.

Max. RGB res.: 1280 x 1024
Video res.: 500 lines
via internal scan doubler

Horiz. scan range
24-78 kHz

37" CRT, 35" viewable
image size

The XP37 features a high-resolution display, and a flat square technology CRT for sharper, more accurate images. Plus, our on-screen control system makes the XP37 the easiest monitor in its class to work with. And its broad source compatibility allows you to display everything from text and graphics to video. And it all takes place inside a cabinet that is every bit as sophisticated as the technology that's inside it.

For more information about the NEC MultiSync XP37, call NEC FastFacts™ at 1-800-366-0476. And ask for document #973701. You'll find the "yardstick" of the industry has everyone else beaten by a mile.

SEE, HEAR AND FEEL THE DIFFERENCE.

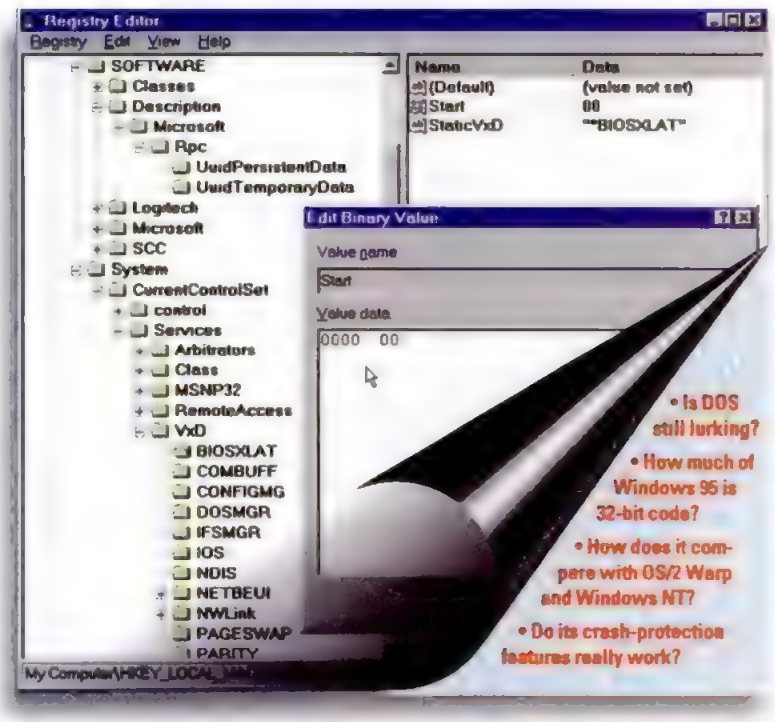
NEC

MultiSync is a registered trademark and See, Hear and Feel the Difference, FastFacts and XP37 are trademarks of NEC Technologies, Inc. GSA#GS-03F-4070B ©1995 NEC Technologies, Inc.

CIRCLE 217 ON READER SERVICE CARD

UNDER THE HOOD

Windows 95 *And Its Competitors*



Months before its release, Windows 95 is already the subject of raging debate among advocates of 32-bit operating systems. The fundamental question: Is it or isn't it? Is Windows 95 a full-fledged 32-bit OS like Windows NT and OS/2, or is it merely a warmed-over version of 16-bit Windows 3.1?

A year ago, we knew only what Microsoft would tell us or what we could glean from very early developer prereleases (see "Chicago: Under Construction," April 12, 1994). Today we know much more. We see a solid operating system that improves on Windows 3.1 in several ways. Still, it is clearly not the "NT Lite" some hoped it would be. Architecturally, Windows 95 resembles Windows 3.1 and Windows for Workgroups 3.11 more than it resembles Windows NT or IBM's OS/2 (see "Modern Architecture"). That's good from the standpoint of compatibility with existing DOS and Windows applications, but it means that some of the baggage found in

IN THIS SECTION

DOS Is Dead? Look Again 146
Window 95: The Programmer's Challenge 150
Joining the Multimedia Party 152

What kind of operating system is Windows 95, anyway? Technical analysis and comparison offers the only unbiased answer.

By Jeff Prosise

Illustration by Jaime Beauchamp

Windows 3.1 will be with us for some time yet.

On the outside, Windows 95 has a very different look from Windows 3.1. On the inside, parts of it are very new, but other parts remain fundamentally unaltered. Here is a critical assessment of Windows 95's foundation and how it compares with that of Windows 3.1, Windows NT, and OS/2.

THE BIG PICTURE

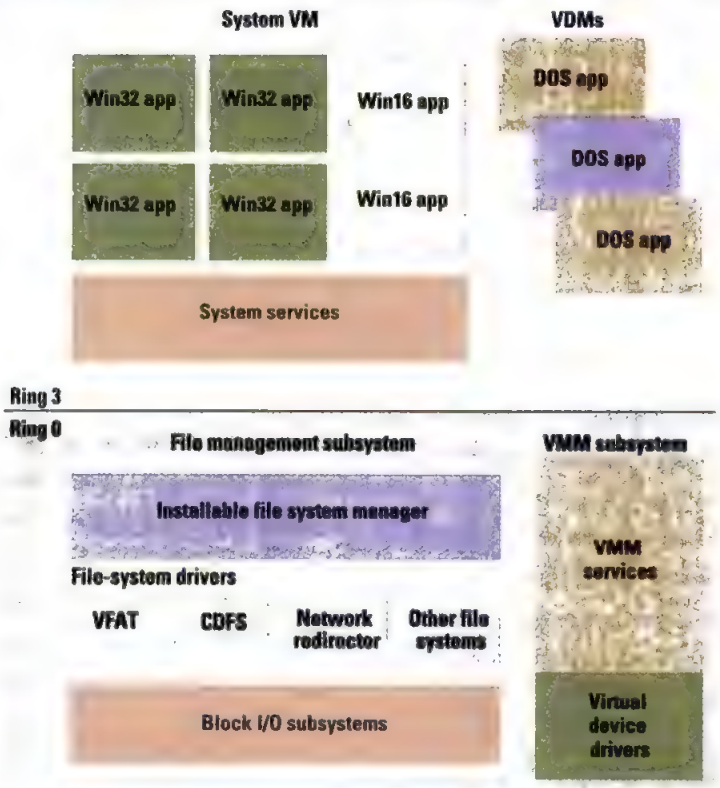
From an architectural perspective, Windows 95 represents the next logical step in the evolution of Windows rather than a radical break with the past. The greatest enhancements include support for 32-bit Windows executables, preemptive multitasking of 32-bit applications, support for multithreaded applications, private address spaces for 32-bit applications, integrated support for file I/O functions formerly handled by DOS, a new file system that remains compatible with the old while supporting long filenames, and an installable file system manager with 32-bit file-system drivers for local, CD-ROM, and network drives. Throw in other enhancements (such as better resource handling and a flat memory-addressing scheme) and the total is an architecture that is superior

MODERN ARCHITECTURE *An inside look at the design of Windows 95,*

WINDOWS 95

The **system VM** (virtual machine) is where all Windows 95 applications execute. Much of the operating system's code and data is also located here. Win32 applications are preemptively multitasked and run within private address spaces, theoretically enhancing reliability. All Win16 programs execute as a single process in a common address space and are cooperatively multitasked. The DLLs USER, USER32, GDI, GDI32, KERNEL, and KERNEL32, which provide operating **system services** to all Windows applications, are loaded into the system VM and mapped into the address space of each process. This boosts performance by eliminating costly ring transitions when system services are called. It also compromises system integrity by exposing parts of the operating system to application programs. Virtual DOS machines (**VDMs**) are where DOS applications execute. They are preemptively multitasked.

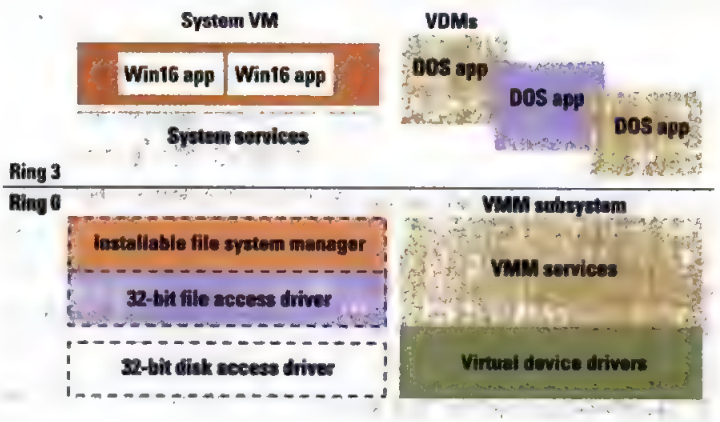
The **file management subsystem** runs in ring 0 and handles all file I/O calls. Most calls are handled in protected mode, but some still switch to Virtual 86 mode to be handled by real-mode DOS code. The **installable file system manager** routes file I/O calls to the appropriate file-system driver. The **VFAT** file-system driver implements Windows 95's VFAT file system, which is similar to the FAT file system with added support for long filenames. The **CDFS** driver replaces MSCDEX and handles input from CD-ROM drives. The **network redirector** file-system driver provides the interface to network drives. Additional file-system drivers may be installed. The block I/O subsystem performs physical disk I/O in response to requests from the file-system drivers.



The virtual machine management (**VMM**) subsystem provides low-level services such as thread scheduling and memory management. It also includes **virtual device drivers** (VxDs) for hardware such as the mouse, keyboard, video adapter, and programmable interrupt controller.

WINDOWS 3.1

The **system VM** hosts all Win16 programs as well as the code and data in system DLLs that provide operating-system services. Win16 programs run in a shared address space within the system VM, where one crashed app can easily corrupt others. Win16 programs are cooperatively multitasked. The system DLLs USER, GDI, and KERNEL provide operating-system services to Windows applications and are mapped into the address space shared by Win16 programs. DOS applications run in separate virtual DOS machines (**VDMs**), which are preemptively multitasked.



The **installable file system manager** and the **32-bit file access driver** (only in Windows for Workgroups 3.11) handle most file operations in protected mode, speeding file accesses. When loaded, the **32-bit disk access driver** handles physical disk I/O.

The virtual machine management (**VMM**) subsystem provides low-level services such as VM scheduling and memory management to the operating system. It also includes **virtual device drivers** (VxDs) for hardware devices.

to present-day Windows and bears comparison with OS/2 but that falls short of the more robust architecture of Windows NT.

Windows 95 uses two rings, or levels, of the four-ring Intel *x*86 protection model: ring 3, where applications and the dynamic link libraries (DLLs) that provide OS services run, and ring 0, where the low-level components of the OS reside. This arrangement, similar to that of Windows 3.1 and OS/2, isolates critical OS components from applications. It provides nominally greater stability than a DOS environment, where wayward applications frequently write into areas of memory they don't own and can corrupt the OS itself.

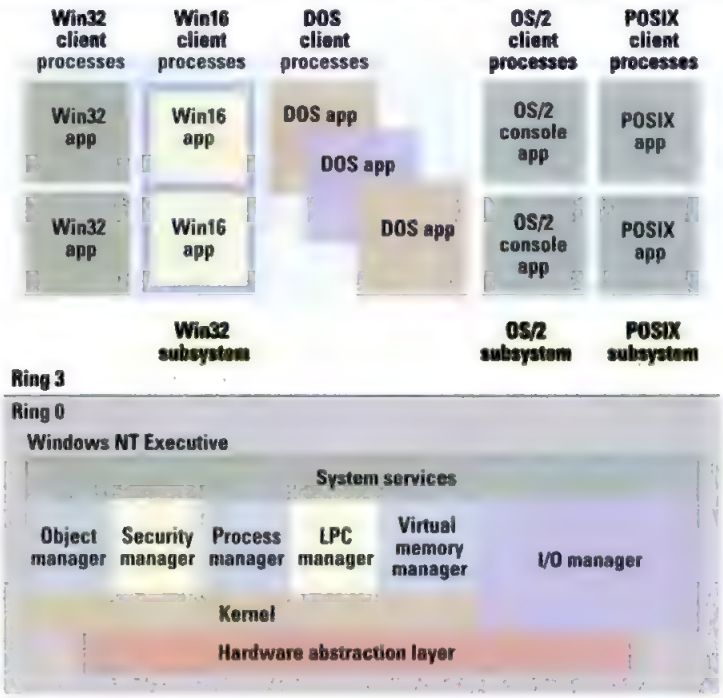
Ring 3 hosts the virtual machines (VMs) in which applications execute. All Windows applications, including 16-bit programs developed for Windows 3.1, run in the system VM. MS-DOS applications run in separate VMs known as virtual DOS machines (VDMs). Virtual machines provide protection against crashes by preventing applications executing in one VM from seeing applications executing in another and writing into each other's address spaces. As far as an application is concerned, a process executing in another VM may as well be running on another PC. (A

Windows 3.1, Windows NT, and OS/2 Warp from the architect's perspective.

WINDOWS NT

Windows NT utilizes a client/server model in which application programs (clients) each invoke services (servers) indirectly via local procedure calls (**LPCs**) implemented by Windows NT Executive's **LPC Manager.** Win32 applications execute as separate multitasked processes consisting of the application, its address space, and the associated system resources. The **Win32 subsystem** services Win32 API calls executed by client processes and performs I/O on behalf of other subsystems. Win16 applications can run as single processes in a shared VM or in private address spaces, providing them with greater protection from other Win16 programs.

DOS applications are executed as separate processes in separate virtual DOS machines (VDMs). The machine environment within a VDM is designed to mimic the real-mode DOS environment as closely as possible. **OS/2** and **POSIX subsystems** support OS/2 console applications and POSIX applications.

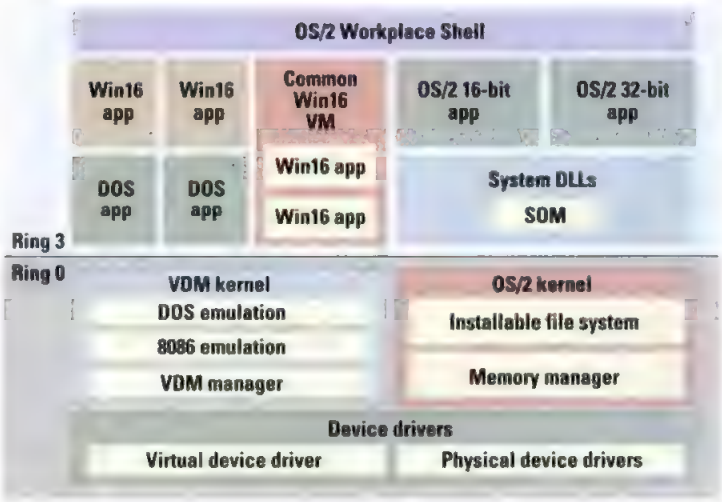


The **Windows NT Executive** provides the operating system services required by the subsystems in ring 3 and manages all internal aspects of the system, such as thread scheduling and memory management. The system services layer serves as the interface between processes in ring 3 and the Windows NT Executive in ring 0.

The **kernel** processes interrupts and exceptions, schedules threads, synchronizes processors in multiprocessor environments, and performs other low-level chores in support of the Executive. The **I/O manager** controls device input and output and provides file system support. The **hardware abstraction layer** performs physical I/O, providing device independence for the I/O manager.

OS/2 WARP

OS/2 provides a variety of application VMs. Native 32-bit and 16-bit OS/2 applications execute in separate preemptively multitasked VMs and can intercommunicate via OS/2's DDE. DOS and Win16 applications can be launched in separate multitasked VMs; Win16 apps in separate VMs can maintain full DDE and OLE 2.0 links with each other and DDE links with 32-bit OS/2 applications. You can also run multiple Win16 applications in a **common Win16 VM,** where they are cooperatively multitasked. A variety of OS/2 API services including **SOM** (System Object Model) services are provided by **system DLLs** that can be called without a costly ring transition. The **OS/2 Workplace Shell,** executing at the application level, provides a true object-oriented user interface.



The **OS/2 kernel** provides many basic API services, file-system support, memory management, and the hardware interrupt manager. The virtual DOS machine kernel (or **VDM kernel**) provides DOS emulation, 8086 emulation, and VDM management. **Virtual device drivers** (VxDs) provide hardware abstraction; **physical device drivers** interface directly with the hardware layer.

process is a running application, its address space, and its resources.) Theoretically, it's difficult for a DOS application to bring down Windows 95 by intruding upon code and data owned by something else. In practice, however, it's quite easy for a DOS program to crash the system, because some memory is global to all VMs.

The system VM is unique among VMs in that it hosts multiple concurrent processes. Windows 95 applications (those written to the Win32 API) are isolated from one another in private address spaces supervised by the memory manager running in ring 0. Windows 3.1 applications (those written to the Win16 API) run in an address space shared by all active Win16 apps. Thus, Win16 programs operate in essentially the same environment that they ran in under Windows 3.1: They can see each other, but they can't see their Win32 counterparts. (In contrast, OS/2 and Windows NT 3.5 can run Win16 apps in private address spaces, providing better protection and marginally better multitasking.)

Win16 programs are still cooperatively multitasked as they were in Windows 3.1, but Win32 applications are preemptively multitasked. So by just upgrading to 32-bit versions of your applications, you'll get a smoother-running system. Until you replace those 16-bit applications, however, Windows 95 won't divvy up processor time any better than Windows 3.1.

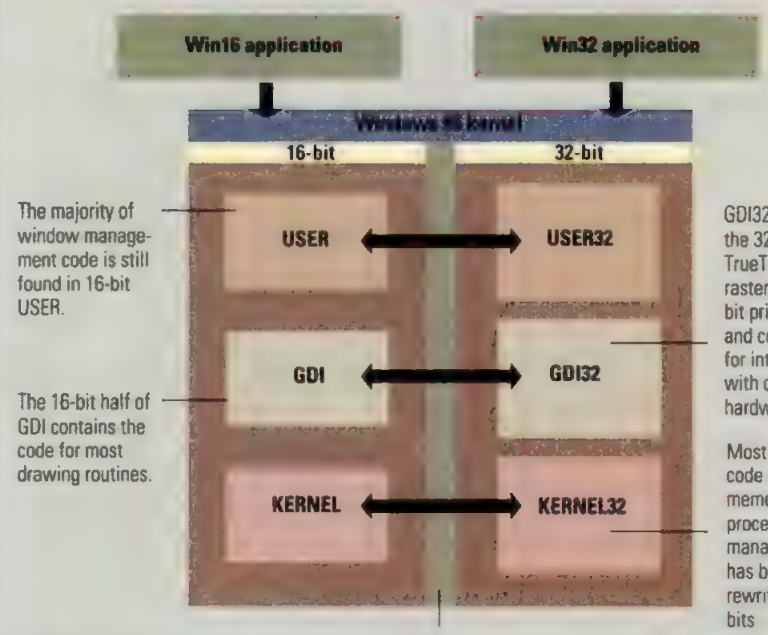
Within the private address space allocated to a Win32 process, the application has a 4GB view of memory. The application is loaded in the lower half of the address space, normally at the 4MB mark. DLLs mapped into the process's address space are loaded between 2GB and 3GB, with the upper gigabyte reserved for system DLLs and virtual device drivers (VxDs). The system DLLs GDI, GDI32, USER, USER32, KERNEL, and KERNEL32—the 16- and 32-bit halves of the GDI, USER, and KERNEL modules present in Windows since Version 1.0—provide services to the OS. GDI and GDI32 are primarily responsible for output to the screen and printer, USER and USER32 for window management, and KERNEL and KERNEL32 for the management of memory, processes, and threads. Placing these components of the OS in ring 3 enhances performance by minimizing time-consuming ring transitions. It also makes them somewhat vulnerable to applications that write to areas of memory they shouldn't. This is an Achilles heel that Windows NT proponents are quick to point out when explaining why Windows NT is slower than Windows or OS/2.

This aspect of the architecture is fundamentally different from Windows NT, which isolates ring 3 OS code and data in protected subsystems that run in address spaces separate from the applications. Using a client/server message-passing mechanism implemented in the Windows NT Executive, Windows NT applications ("clients") invoke OS services in the Win32 subsystem (the "server") indirectly and cannot access the memory owned by the subsystem. Because OS code is either mapped into a separate address space or protected in ring 0, it is virtually impossible for an application to compromise the system. This design is the main reason that Windows NT is so extraordinarily stable. Even OS/2 can't boast such stability, though it does play tricks with selectors (values loaded into segment registers in protected mode to access areas of memory) to protect OS components in ring 3.

Drop down to ring 0 in Windows 95 and you'll find the virtual machine management (VMM) subsystem—which includes a group of VxDs—and the file management subsystem. The VMM and its drivers work together to virtualize hardware such as the keyboard, mouse, and interrupt controller and to perform low-level operations such as scheduling threads for processor time and paging memory to and from the hard disk. The VMM subsystem is not new in Windows 95, but its role has been expanded.

The ring 0 file management subsystem is new to Windows 95, although elements of it were also present in Windows for Workgroups 3.11. This subsystem is heavily layered, with the installable file system (IFS) manager at the top, file system drivers in the middle, and the multitiered block I/O subsystem (which manages

WINDOWS 95 SYSTEM DLLS: THE 16-BIT/32-BIT DIVISION OF LABOR



Our Contributors: CHARLES PETZOLD and JEFF PROSISE are contributing editors of *PC Magazine*. ANDREW SCHULMAN is the author of *Unauthorized Windows 95*. THOMAS MACE was the associate editor in charge of this story, and JAY MUNRO was the project leader.

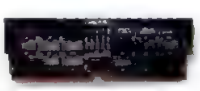
THE ONE MEMORY SHARED BY MILLIONS.

What's your favorite memory? If you answered Kingston, you're in very good company. You see, we've become the most popular memory in the world by maintaining an uncompromised dedication to reliability. That means bench testing each and every product in the system for which it was designed with diagnostics written by the system's original manufacturer. When it comes to compatibility, we leave absolutely nothing to chance. We suspect that's why—in a recent Gallup poll—Kingston was reported as the largest independent memory supplier to the Fortune 1000 Companies. They rely on our upgrades every single day—and you can too. For more information, call your local dealer or Kingston at (800) 835-6575.

Find out why, when it comes to memory, we're on the minds of millions.

Desktop PC Memory

Portable PC Memory



Workstation Memory

Laser Printer Memory

Kingston TECHNOLOGY CORPORATION

THE INSIDE NAME IN UPGRADES

(714) 435-2600 or Fax (714) 435-2699. In Canada: Dynatech Ltd (416) 636-1000 or in Mexico: Intec (81) 335-6161. Ingram Micro (5) 328-1190

PC MAGAZINE CIRCLE 106 ON READER SERVICE CARD

“Oh yeah. No question.
Access is definitely easier
to use than Alpha Five.
Absolutely.
Cross my heart, hope to
aaaahhh-uuggggrrhhhh.”
– Ex Microsoft Salesperson

Time and again we run into customers who tell us Microsoft is out there saying Access is actually easy to use. Well, we'd like to set the record straight.

They're dead wrong. Think we're exaggerating? No way. For example, let's say you want to perform a task as fundamental as setting up an order entry system with live inventory updates.

With Access, you get to write and debug 51 lines of code that make conjugating Latin verbs seem like child's play. But Alpha Five™ has a ready-made solution built-in. Just choose the posting rule from a drop-down menu, fill in a simple table, and you're done.

In fact, Alpha Five has dozens of built-in solutions for virtually every database task. So you can do anything you want by simply pointing, clicking, dragging and dropping.

Alpha Five

For fundamental tasks like live order entry, just fill in an Alpha Five table. Or write and debug 51 lines of complex Access code...you decide.

Microsoft Access

We've even got Genies to walk you through building databases, reports and queries from new or existing files. It's easy to build even the most serious applications in virtually no time at all.

All of which makes Alpha Five a lot easier to use and learn than Access. And if anyone tells you otherwise, well, check to see if their nose is growing. Visit your software reseller today, or call 800-451-1018 Ext. 555 to get a free trial version ($9.95 shipping and handling).

Alpha Five
For Windows
The Powerful Database Anyone Can Use.

800-451-1018 Ext. 555 ✔ Fax 617-272-4876

CIRCLE 196 ON READER SERVICE CARD

ABR

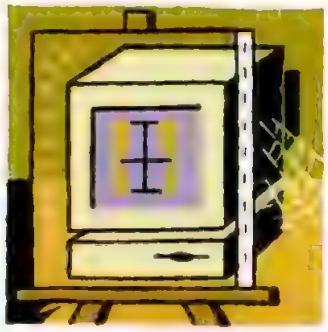
DOS Is Dead? Look Again

By Andrew Schulman

Microsoft is careful never to claim that Windows 95 is a Windows NT derivative. Still, the company has left many developers, computer journalists, and end users with the impression that it is a ground-up rewrite of Windows 3.*x* with an architecture that's closer to Windows NT than to the old Windows DOS combination.

To cite just one example, the February 1994 issue of the *Microsoft Systems Journal* (page 20) states that "Windows no longer can be likened to a fancy paint job on an old MS-DOS Yugo. Because the entire operating system is freshly designed from the ground up, you now have killer features such as threads, memory-mapped files, and asynch I/O."

In my view, for better or for worse, Windows 95 is far from being an "NT Lite." Instead, Windows 95's structure is quite closely related to the architecture behind Windows 3.*x* 386 Enhanced mode. Yes, Microsoft has made many improvements to this underlying foundation (including threads and so forth), but Windows 95 remains fundamentally closer to the combination of Windows for Workgroups 3.11 and Win32s than to Windows NT.



The industry must bring its expectations in line with reality.

STUDY YOUR WINDOWS 3.X

Particularly crucial to understanding Windows 95 is understanding the Windows 3.*x* Enhanced mode virtual machine manager (which provides APIs such as Hook_V86_Int_Chain, Begin_Nest_V86_Exec, and Allocate_V86_Break_Point) and virtual device drivers (such as IFSMGR, IOS, VWIN32, VPICD, V86MMGR, and DOSMGR). For details, see my book *Unauthorized Windows 95* (IDG Books Worldwide, 1994).

Windows 95's relation to MS-DOS is the same as that of Windows 3.*x* Enhanced mode to MS-DOS. Specifically: Windows 95 does not replace DOS, use DOS solely for compatibility with old DOS applications, or rely on DOS solely to boot up. Even Win32 applications under Windows 95 will employ DOS for some operations, such as getting and setting the current program segment prefix (PSP, a DOS data structure that acts as a process identifier), the date and time, and the current drive.

At the same time, even DOS apps running under Windows 95 *will* bypass DOS for file operations (much as Windows for Workgroups 3.11 provides 32-bit file access). And Windows 95 provides memory-mapped file I/O. This new feature is a good example of what bypassing DOS *really* looks like.

WANTING TO BELIEVE

Clearly, many developers and users want to believe that DOS is gone. Indeed, it is easy to blame DOS (and real mode) for all problems and instabilities. They think that if DOS is gone, somehow their systems will automatically be more stable. Windows 95 may or may not be more reliable than Windows 3.*x*, but DOS is still there—just as in Windows 3.*x*.

In response to *Unauthorized Windows 95*, Microsoft has downplayed the importance of the Windows 95 architecture. For example, Rogers Weed, group product manager for Windows 95, told *Computer Reseller News* (January 2, 1995, page 3) that "I don't think [the architectural details] make a difference to most customers."

input and output to the storage devices) at the bottom. Windows 95's native VFAT file system is supported by a file-system driver, as is the new compact disk file system (CDFS), whose driver replaces the MSCDEX CD-ROM driver on systems equipped with CD-ROM drives.

Network redirectors are also supported at this level in the hierarchy, and third parties may add support for additional file systems by providing the requisite file-system drivers. It's entirely possible, for example, that someone will write High-Performance File System (HPFS) and NT File System (NTFS) drivers, enabling Windows 95 users to utilize disk partitions formatted by OS/2 or Windows NT. By contrast, only Microsoft could realistically augment Windows 3.1 with nonnative file systems, because the only hooks are undocumented interfaces hidden deep inside real-mode DOS.

MULTITASKING AND MULTITHREADING

To divide processor time among active Windows applications, Windows 3.1 uses a crude scheduling mechanism known as *cooperative multitasking*. Applications are never forced to yield the CPU to other applications; they yield voluntarily when they call messaging functions in USER to retrieve messages and the message queue is empty. This works reasonably well, because a typical Windows application spins in a continuous cycle, retrieving and dispatching messages and often processing several messages a second. Still, a poorly written application can spoil the party for everyone by engaging in a lengthy processing task and failing to check its message queue for an extended period of time.

Like Windows NT and OS/2, Windows 95 solves this problem with a preemptive scheduler that distributes CPU time at the behest of the OS rather than the applications. Scheduling is performed on a per-thread basis. A *thread* is the atomic unit of execution; it is literally a piece of execut-

Illustration by Timothy Cook

This is indeed odd. If Windows 95's relationship to DOS doesn't matter, why the many claims that Windows 95 eliminates DOS, that it is a brand-new integrated operating system, and so on? One reason may be that these claims help Microsoft justify its hefty price hike to OEMs. Another may have to do with the word *integrated* itself, since the proposed antitrust consent decree between Microsoft and the U.S. Department of Justice explicitly excludes "integrated products" from its clauses.

Whatever the reasons for Microsoft's claims, the truth about the architecture of Windows 95 does matter to users and developers. As one example, several beta testers have noticed that even in a *pure* Windows 95 configuration running only Win32 apps, they can't start any more apps if all DOS memory is allocated by a piggish device driver. This is because each Win32 app running in Windows 95 requires some DOS memory for its PSP.

THE BOTTOM LINE

Windows 95 is an excellent product, but the industry must bring its expectations in line with the realities of the design. Otherwise, when Windows 95 finally ships—hopefully in 1995—it could face a nasty backlash from those who believed in NT Lite only to find they have Windows 4.0 lashed together with MS-DOS 7.0. □

ing code. The primary scheduler, which is part of the VMM subsystem, pauses every 20 milliseconds (by default) to reevaluate the status of each active thread and determine which thread gets the processor next. Individual time-slices may be divided among two or more threads by a secondary scheduler that works with the primary scheduler to ensure that the CPU is utilized as efficiently as possible.

Win16 and MS-DOS apps are limited to one thread each, but Win32 processes may spawn additional threads. Secondary threads are useful for performing asynchronous tasks in the background, such as buffering input from a serial port, recomputing the values in a spreadsheet, or spooling data to a printer. Writing an app that performs background processing requires a great deal more effort in Windows 3.1, and the results are rarely as satisfactory, because of the built-in limitations of the scheduler. With Windows 95, Windows users will finally experience the superior multitasking that Windows NT and OS/2 users have enjoyed for years. Applications will be more responsive and hourglass cursors less common.

Win16 applications in Windows 95 are still multitasked the old way, running much as they do under Windows 3.1. But though a Win16 app can freeze other Win16 apps by going too long without dipping into the message queue, this alone will not visibly affect Win32 applications. The Win32 apps will continue to receive their time-slices, just as background VDMs do under Windows 3.1 today. OS/2 has an option permitting Win16 apps to run in separate sessions (virtual machines), meaning those apps can be multitasked preemptively just like native 32-bit apps. If you plan to run Win16 programs for a while, this is a feature you'll want.

OS/2's one weakness in multitasking is its serialized input queue. Messages generated from mouse and keyboard events wait in a single, system-wide input queue to be retrieved by applications. If one application fails to retrieve input messages, others may be prevented from retrieving them also. When this occurs, it is typically debilitating enough that the user can't even switch away from the offending application, because the message signaling the switch gets stuck in the queue behind all the others.

Windows 95 and Windows NT circumvent this problem by providing each application with a private input queue, a technique known as *deserialization*. A Windows 95 or Windows NT application that goes for an extended period of time without retrieving messages will stop responding to input but won't prevent other programs from responding, and it won't prevent you from switching to another application. OS/2 programmers can avoid serialization problems by making sure their apps are written properly, however. If an application can't process a message quickly, it should use a message pump to keep the messages flowing or delegate the job to a secondary thread.

THE API

An OS's inner functions are accessed by its applications through the application programming interface, or API. An API is a set of subroutine-like procedures called *functions* that programs can call to open files, allocate memory, and perform other routine tasks. In Windows 95, these functions are implemented in GDI, GDI32, USER, USER32, KERNEL, KERNEL32, and other DLLs. Since these DLLs are mapped into each process's address space, calling an API function amounts to little more than executing a CALL instruction to the proper location in memory.

The API is an important part of an OS's architecture, because it defines how programs will interact with the system. It is also one of the primary factors that decides who will support a new OS. Today's APIs are complex, often comprising a thousand or more functions and requiring a year or more of full-time study to master. Force programmers to learn a new API and you run the risk that no one will develop applications for your platform, especially if competing platforms with familiar APIs are outselling yours ten to one. That's one solid reason Windows applications far outnumber OS/2 apps.

Windows 95 uses the Win32 API, which is a 32-bit version of the 16-bit Windows 3.1 API and is native to Windows NT. A simple port of a Windows 3.1 application to Windows 95 generally requires no more than a few days; porting from Windows NT (or the little-used Win32s subsystem that converts Windows 3.1 into a 32-bit platform) requires even less. Many Windows NT applications, in fact, run unchanged under Windows 95. And if you were prescient enough to write your Windows 3.1 application in C++ using the Microsoft Foundation Class (MFC) library, porting could be as simple as loading up the source code and recompiling.

Of course, a simple port generally isn't enough. Most developers coming from Windows 3.1 will want to take advantage of Windows 95's new features, such as multithreading, memory-mapped files, and the common controls library (new controls provided in a DLL that supplement the built-in control classes). Adding support for such features often impacts the structure of your program and requires more than just a rewrite. For this reason, upgrades to some

popular applications will lag behind the release of Windows 95 by several months.

How does Windows 95's version of the Win32 API square with the Windows NT version? Each supports some features that the other doesn't, but there is a very high degree of overlap. Windows 95 doesn't support Windows NT's security and event-logging functions, but it includes new functions for image color matching and other operations that Windows NT doesn't. Contrary to some press reports that describe Windows 95's API as a subset of Windows NT's, Windows 95 expands the Win32 API; neither Windows 95 nor Windows NT currently provides *the* 32-bit Windows API implementation. But because the bulk of the API is common to both, it is now possible for developers to support Windows 95 and Windows NT users with a single code base (for further discussion, see "Windows 95: The Programmer's Challenge").

So why is Microsoft willing to settle for any 16-bit code in Windows 95? Was this a conscious decision?

OLE: THE API'S OTHER HALF

Unfortunately for developers, the Win32 API is only half the story. To qualify to use the Windows 95 logo, developers of most applications will have to add Object Linking and Embedding (OLE) 2.0 support. OLE is a vast, complex, and (by most programmers) poorly understood protocol that is very different from what most Windows programmers are accustomed to. OLE programming is orders of magnitude easier if you work in C++ and take advantage of the substantial OLE support built into the Microsoft Foundation Classes (MFC), but the majority of Windows applications today are still written in C. That will change, but for now OLE presents a major obstacle to many developers.

The driving force behind OLE is the notion that interoperability among applications can be taken to a higher level if code and data are encapsulated in objects; applications that use those objects can then interact with them using standard interfaces. OLE defines protocols for in-place editing, drag-and-drop data transfers, structured storage, custom controls, and more.

OLE faces competition from OpenDoc and System Object Model (SOM), but if Windows is ever to become a fully object-oriented, document-centric OS, OLE is the vehicle that will get it there. The Component Object Model technology upon which OLE is based is being woven into the fabric of Cairo, the fabled successor to Windows NT. If so, OLE is on its way to becoming not just an extension of the API, but an integral part of the OS architecture.

Windows 95 makes it abundantly clear that Microsoft sees OLE as more than a tool for applications developers. Many of the functions of the user interface shell are accessed through OLE interfaces in what may be a preview of things to come. DLLs can now provide document icons to the shell on the fly by registering to be notified whenever an icon is displayed; this is designed to strengthen the bond between documents and applications.

Windows programming is changing—and fast. The underlying API is becoming less important than which class library you use. To write first-class Windows 95 applications, even some of the more experienced Win32 developers will find themselves wading through stacks of new programming documentation describing obscure interfaces that are unrelated to the API. It may not be pleasant, but it'll be a fact of life. Programmers willing to bite the bullet and adapt to the new order now will save themselves a lot of time and trouble down the road.

16-BIT VS. 32-BIT CODE

It's no secret that Windows 95, unlike Windows NT (and, to a lesser extent, OS/2), is no thoroughbred 32-bit OS. Some of the 16-bit code from Windows 3.1 still resides in GDI, USER, and KERNEL. Most of KERNEL has been rewritten with 32-bit code and renamed KERNEL32, but about half of what was formerly GDI and almost all of USER is still 16-bit. How much of a problem does this present for users? How does it affect performance? And does it matter that an OS written for 386, 486, and Pentium CPUs still relies partially on 16-bit code?

First, let's clarify the difference between 16- and 32-bit code. Prior to the 386, Intel processors were built primarily to deal with 16-bit quantities. For example, a pair of 16-bit numbers could be multiplied with a single instruction, but multiplying two 32-bit numbers required perhaps 15 to 20 instructions. More important, memory could be addressed efficiently in chunks of up to 64K, but dealing with larger expanses of memory required more extraordinary measures. Merely increasing the size of an array from 64K to 65K in a C program could easily halve the program's speed (or worse).

The 386 fixed this by increasing the width of the CPU's registers from 16 bits to 32 bits and by upgrading the instruction set to handle 32-bit quantities. Programs could now multiply 32-bit numbers with a single instruction and address areas of memory as large as 4GB with ease. Since a 386 will execute 16-bit instructions, a programmer writing code for it can choose between 16- and 32-bit code (or even mix the two together). The latter is superior when dealing with 32-bit quantities and large regions of memory, but it offers no advantage when dealing with 16-bit data.

Sixteen-bit code is not inherently bad. It *can* be as fast as or faster than 32-bit code, depending on what the code is designed to do and how well it is written. The 16-bit portions of the system won't be a drag on performance if they stay within the bounds of what 16-bit code can do efficiently. If 16-bit code is isolated in 16-bit code segments, and 32-bit code in 32-bit code segments, the use of 16-bit code won't swell the code size either. (16-bit code and 32-bit code occupy the same amount of space unless they're mixed together in the same segment, in which case one must be expanded in order to differentiate it from the other.)

Still, it's a little disconcerting to learn that an OS designed for 32-bit processors contains 16-bit code at all. So why is Microsoft willing to settle for any 16-bit code? Is this the result of a conscious design decision, or is Microsoft simply trying to put the best face on a mediocre design?

Probably a little of both. Microsoft admits that the problem was partially one of resources: The company felt it didn't have the time to rewrite everything using 32 bits. In retrospect, given the delays, maybe it could've taken the time. But another factor

Introducing ABC FlowCharter 4.0.
The reigning business graphics heavyweight.

When it comes to creating high-quality business diagrams, new ABC FlowCharter 4.0 gives you ultimate power, flexibility and control. The program is loaded with four fully-integrated modules specifically designed to meet the demands of the business graphics user. Whether you need to create complex flowcharts for TQM and BPR, analyze your statistical data, or simply pull together clean, colorful presentation charts in a matter of minutes, ABC FlowCharter 4.0 can help you accomplish your mission. Only ABC FlowCharter 4.0 features automatic line crossovers, intelligent line routing and data fields. And those are just a few of the features we've added to make your life easier. Right now you can get ABC Flowcharter 4.0 for as little as $99.95 upgrade. And you can upgrade from any business graphics program you already own. No other program gives you such complete power for so little. If you want to settle for less, it's your business. Contact your favorite reseller or call **1-800-769-3540.**

FEATURES	ABC FlowCharter	Visio 3.0	CorelFLOW2.0
Intelligent line routing	★		
Automatic add/delete shapes	★		
Automatic line crossovers	★		
Data fields	★		
OLE 2.0 automation	★	★	
Royalty free flowchart viewer (ABC Viewer™)	★		
Statistical Process Control Charting (ABC DataAnalyzer™)	★		
21 pre-defined diagram templates (ABC SnapGraphics™)	★		

$99.95 UPGRADE*

MICROGRAFX®

BEST BUY · CORPORATE SOFTWARE · SOFTWARE SPECTRUM

*U.S. SRP ($149.95 Canadian) for users of any Micrografx product or any version of the following competitive products: Visio, CorelFlow, AllClear, Flowcharting 4, EasyFlow, or other diagramming software. Copyright 1995© Micrografx Inc. All rights reserved. All trademarks are owned by their respective companies.

CIRCLE 361 ON READER SERVICE CARD

in the decision was compatibility with existing applications. Some of the 16-bit code in USER is so idiosyncratic that Microsoft feared a ground-up rewrite would inevitably break a number of Win16 applications. Some efficiency may be gained by allowing Win16 apps to call directly into the 16-bit GDI, USER, and KERNEL and avoid thunking to 32 bits. (*Thunking* is the mechanism used to call 32-bit code from 16-bit code, or vice versa, and to translate the parameters that accompany the calls.)

This efficiency is offset by the fact that some of the calls made by Win32 apps must now be thunked down to 16 bits, something that isn't necessary in Windows NT and OS/2. Microsoft programmers have gone to great pains to maximize thunking efficiency, but thunking still takes time. Win32 apps can't help but run slightly slower because of the 16/32-bit division of labor in the OS kernel.

The diagram "Windows 95 System DLLs: The 16-Bit/32-Bit Division of Labor" illustrates the 16/32-bit code dichotomy. The 16-bit GDI, USER, and KERNEL and the 32-bit GDI32, USER32, and KERNEL32 are separated by a thunking layer that facilitates calls back and forth. When a Win32 application calls an API function, the call is received on the 32-bit side but may eventually execute code in GDI, USER, or KERNEL. Conversely, Win16 apps that invoke API function calls into the 16-bit half of the kernel may be thunked internally to GDI32, USER32, or KERNEL32.

On the surface, there's nothing wrong with this arrangement—especially for an OS that is designed to run both 16- and 32-bit apps. But the 16-bit code in the kernel presents something of a problem because it is *nonreentrant*, meaning two threads cannot access it at the same time without risking a nasty system crash. This isn't a big deal in Windows 3.1, because Windows apps are not preemptively multitasked. But it's a grave concern in Windows 95, where processes *are* preempted and any thread is likely to be interrupted at any point during its execution.

As Adrian King documented in his book *Inside Windows 95* (Microsoft Press, 1994), Microsoft explored a number of solutions to this problem before finally deciding upon the Win16Mutex. (A *mutex* is a flag that warns threads away from the 16-bit kernel when another thread is executing code there.) Win32 threads that wish to call across to the 16-bit side must stop what they're doing if the flag is raised. Significantly, a Win32 thread sets this flag only when it enters and leaves the 16-bit kernel, but threads devoted to Win16 processes force the flag to be set the whole time they're active.

The result? Win32 apps may be less responsive when Win16 apps are running, and a Win16 app that locks up may lock up Win32 apps, too. This is in stark contrast to Windows NT and OS/2, where 16-bit apps have no effect on 32-bit apps other than the CPU time they consume.

Exactly how much the Win16Mutex bottleneck will affect Win32 processes is still unclear. (*PC Magazine* will compare the performance of 32-bit applications with and without Win16 apps running later this year, when final Windows 95 code is available.) What is clear is that you'll get better performance from Windows 95 if you run only 32-bit applications.

The system DLLs aren't the only components of Windows 95 in which 16-bit code and data can be found. As Andrew Schulman notes in his book *Unauthorized Windows 95* (IDG Books Worldwide, 1994), Windows 95 still relies on several 16-bit DOS data structures and at times

Windows 95: *The Programmer's Challenge*

By Charles Petzold

Writing good application code is tough enough. Revising or rewriting that code for new operating systems and application programming interfaces (APIs) can be pure torture. Programmers should be able to expand their knowledge of existing APIs rather than continually having to learn completely new ones.

Fortunately for programmers, the evolution of Windows over the past decade has been fairly smooth in this regard. As versions of Windows have expanded in functionality, they have also retained much backward compatibility. An application written for Windows 1.0 in 1985 would require minimal changes (if any) to run under Windows 3.1 in 1995. It might look a bit quaint, but it would still run.

But the move from the 16-bit architecture of early Windows to a 32-bit interface is the biggest leap yet. Using 32-bit memory management and integers can provide programs with improved efficiency that simply cannot be ignored. This move to 32 bits has a long history—with Microsoft providing programmers with an unsettling variety of 32-bit solutions.

First there was something called WINMEM32, a dynamic link library that allowed programmers to write some (but not all) of their Windows 3.0 code using a 32-bit address space. Then there was a Windows 3.1 API called Win32s (s for subset), an interim 32-bit API that eased the transition to Windows NT and Windows 95 but fell short of the Win32 API defined for Windows NT. Then came Win32c (c for compatible), an API that Microsoft initially defined and then abandoned for Windows 95. Although Microsoft has attempted to allay programmers' fears by defining APIs that are subsets of one another, few people are fooled.

HOPING FOR DOMINANCE

Windows programmers should be crossing their fingers in the hope that Windows 95 will soon dominate their users' market as much as Windows 3.1 does now. Such market dominance will give them a vital tool: the ability to focus on a single API, to learn it inside and out with little fear of their efforts going to waste.

Normally, porting an existing 16-bit program to a 32-bit architecture involves two fundamental issues—integers and memory addressing. Windows, however, adds other layers of

switches to Virtual 86 (V86) mode to execute old 16-bit DOS code. The 16-bitness may not be bad in itself, but switching from protected mode to V86 mode and back exacts a price in performance. Fortunately, the most important calls—those directly related to file I/O—are handled in protected mode. Windows 95 seems to reserve V86 mode for rather innocuous tasks, such as setting the current drive and getting and setting the current time, for example. But the code requesting those tasks ends up being reflected to a 16-bit handler that executes in V86 mode.

This fact has led some to charge that Windows 95 still requires DOS, and that it's therefore not strictly an integrated OS. Whether it is or isn't ultimately boils down to an issue of semantics. Yes, Windows 95 makes some use of 16-bit code that used to be part of DOS. No, it doesn't require a separate product called MS-DOS in order to run. This latter fact is probably the more relevant one for end users who tend to think of DOS not as a code base but as something you buy in a box at a computer store.

A final instance in which 16-bit code comes into play is when Windows 95 communicates with a device for which a 32-bit driver is not available. For compatibility with existing hardware, Windows 95 can still use 16-bit real-mode device drivers when necessary. This isn't a problem in and of itself, but 16-bit drivers impede performance and may reduce the amount of memory available to DOS apps. Windows 95 will therefore provide 32-bit versions of common 16-bit drivers such as MSCDEX and ASPI4DOS. In the future, most hardware devices for which Windows 95 does not provide direct driver support will come with 32-bit drivers written by their manufacturers.

RESOURCE MANAGEMENT

One problem that has pestered Windows users since day one is its limitations on free system resources. Windows 3.1 sets aside a fixed amount of memory in local heaps (64K segments of memory addressed with 16-bit pointers) belonging to USER and GDI. These hold data structures for windows, menus, GDI objects such as brushes and pens, and other resources that an application creates in the normal course of doing business. The percentage of free system resources displayed in Program Manager's About box is roughly equivalent to the percentage of memory in these heaps that is currently unallocated.

When the heaps fill up, Windows will complain about insufficient memory and refuse to start another program, even if there are megabytes of free memory remaining elsewhere in the system. To make matters worse, many programs fail to free some of the resources that they own prior to terminating, and Windows doesn't clean up behind them. The mere act of repeatedly starting and stopping one of these programs may drop free system resources to where Windows is unusable. The only recourse is to restart Windows.

This situation is greatly improved. Many of the data structures have been moved out of the 16-bit USER and GDI heaps and relocated in 32-bit heaps, whose size is virtually unlimited. So why weren't *all* data structures moved to 32-bit heaps? Compatibility. Some Windows 3.1 applications bypass the Windows API and access objects in the heaps directly. Moving everything to 32-bit heaps breaks these applications and renders them incompatible with Windows 95. The OS architects found themselves in the unenviable position of evaluating each object type and moving only those that weren't likely to

complexity to this process.

C, the language used most widely in Windows development, defines three different integer types: The *short* (usually 16 bits), the *long* (usually 32 bits), and the *int*, which can be 16 bits or 32 bits depending upon the underlying hardware and operating system. Skillful C programmers can use these three integer types to make their code easily portable from 16- to 32-bit environments.

The early developers of Windows, however, avoided the int almost entirely; instead, they defined new data types that were specifically 16 bits or 32 bits in length. This did not display much foresight. A more thoughtful definition of integer data types might have alerted programmers early on that Windows would one day be making the 32-bit plunge.

Cross your fingers for a single API.

Illustration by Timothy Cook

Some 16-to-32 bit changes (for example, graphical coordinates and handles that programs use to refer to objects such as windows) have even necessitated changes in function calls and messages that programs receive from Windows. In porting apps from Windows 3.1 to Windows 95, some changes will be mindlessly mechanical (or can even be automated), but programmers will also be meticulously searching for those 16-to-32 bit gotchas.

MEMORY MANAGEMENT

The other big issue is memory management. Rather than dealing with the insanity of 64K memory segments, programmers can now use a flat 32-bit address space. No programmer alive mourns this change, but those with applications that deal with huge chunks of memory will have to revise their entire memory management strategy.

Interestingly enough, the changes in the user interface of Windows 95 can be largely ignored, at least for fast ports of normal applications. It's always been one of the wonders of Windows that the visual interface is treated in an abstract manner from the programmer's perspective. Still, application developers will want to keep up with current trends, such as toolbars, status lines, and the monster known as OLE. The good news is that Windows 95 is still Windows. Most of the programming skills and knowledge already learned over the past decade need not be unlearned—only supplemented. Windows is richer now, not poorer. □

cause major compatibility problems.

In addition to providing expanded heap space, Windows 95 also cleans up after apps that fail to clean up after themselves. Resources are tracked on a per-thread basis; when a thread ends, any resources it failed to deallocate are automatically freed by the OS.

Here again Microsoft encountered compatibility problems with existing programs. Some Windows 3.1 applications intentionally leave resources behind for use by other programs or DLLs. Automatic resource cleanup poses a problem for these applications.

The solution? Resources left behind by Win16 apps aren't freed until all Win16 apps are closed. You may still experience resource leakage if you run primarily Win16 apps, but because of the expanded heap space, the leakage won't be as severe. And lost resource space can be recovered by terminating all active Win16 processes. In addition, if you know that your favorite Win16 applications do not rely on the persistence of resources that they leave behind, you can mark them as such and their resources will be cleaned up immediately.

One interesting quirk related to Windows 3.1's handling of memory has been partially carried over to Windows 95, at least in current beta versions. In Windows 3.1, information regarding active programs is stored in data structures known as task databases, or TDBs. Each TDB has embedded inside it a DOS program segment prefix (PSP) that must be located in memory below 1MB. (This region of memory is sometimes referred to as *glob-*

Joining the Multimedia Party

By Jeff Prosise

Up to now, Windows hasn't brought much to the multimedia party. It's never been the great graphics performer DOS is, because it denies programs direct access to the video buffer. And its sheer overhead makes makes achieving high-quality video and audio difficult. But that's rapidly changing. With Windows 95, multimedia developers should have a far better array of tools available.

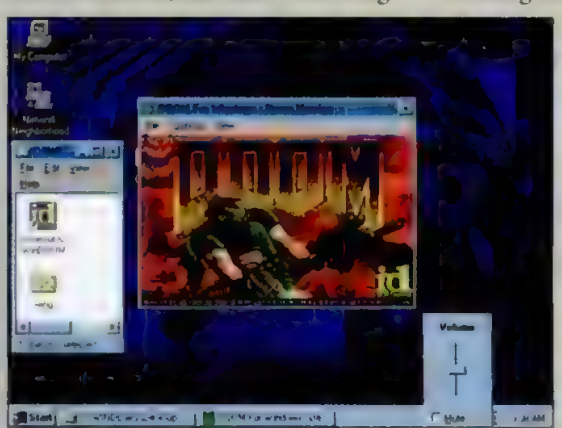
FOR GAMES: WING AND WINTOON

The most popular tool for achieving superior graphics performance is the WinG (pronounced *win-gee*) library introduced last year. WinG allows programmers to reduce overhead by bypassing the Graphics Device Interface (GDI) and writing directly to a bitmap. Completed bitmaps are then transferred to the video buffer with optimized versions of Windows' BitBlt and StretchBlt functions. More important, WinG keeps graphics accelerators in the loop, so games that utilize WinG run astonishingly fast; so fast, in fact, that they sometimes outperform their DOS counterparts.

WinToon, another new multimedia graphics API, is a tool for making cartoon-like animations by creating foreground frames and overlaying them on a static background. The resulting .AVI files are optimized for speed, because only the portions of each frame that change are redrawn.

FOR 3-D: OPENGL OR REALITY LAB?

At the moment, it looks as if the first release of Windows 95 will not support OpenGL, the 3-D graphics language introduced in Windows NT 3.5. But OpenGL is expected soon thereafter, probably in the form of a freely distributable dynamic link library. OpenGL performs shading, texturing, hidden surface removal, and other rendering operations in real time.



Thanks to WinG's ability to bypass the GDI, classic games like id Software's DOOM can run as fast under Windows as they did under DOS.

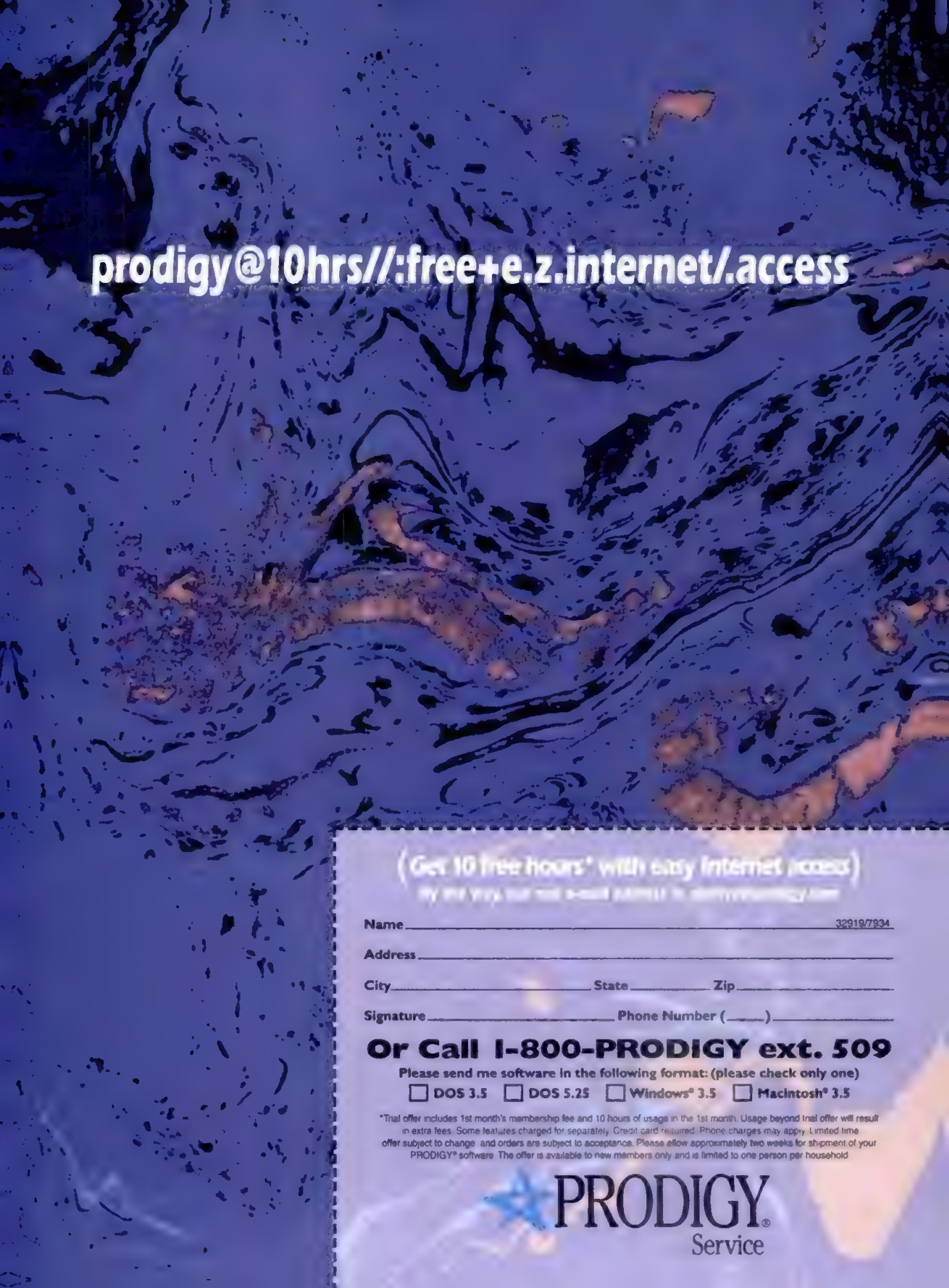
Microsoft recently acquired the London-based RenderMorphics, whose Reality Lab graphics library supports high-performance 3-D rendering in hardware and software. This gives Microsoft another new technology that is ideally suited for game and multimedia development. That's great news for users, but developers must now guess which (if either) API will become the standard.

Windows 95 will also introduce AutoPlay, a feature that allows a multimedia application on CD-ROM to be started automatically when the CD is inserted into a drive.

Compression also plays a big role in boosting multimedia performance, particularly when it comes to full-motion video. Windows 95 will ship with 32-bit versions of the Indeo and Cinepak codecs. An MPEG driver apparently will not be included, but Microsoft is actively promoting the standard and has been demonstrating a software decoder from Mediamatics that plays flawless high-quality MPEG video on a 90-MHz Pentium with a PCI bus.

Other works in progress include TrueSpeech voice compression, a general MIDI standard for Windows, a standard for digital joysticks, and a new multisession CD format that combines audio and data on one disk.

Only time will tell if Windows 95 can offer one of the biggest multimedia platforms around. But one thing's for certain: No matter what the outcome, it's going to be great fun getting there. □



(Get 10 free hours* with easy Internet access)

Name _____ 32919/7934

Address _____

City _____ State _____ Zip _____

Signature _____ Phone Number (___) _____

Or Call 1-800-PRODIGY ext. 509

Please send me software in the following format: (please check only one)

☐ DOS 3.5 ☐ DOS 5.25 ☐ Windows® 3.5 ☐ Macintosh® 3.5

*Trial offer includes 1st month's membership fee and 10 hours of usage in the 1st month. Usage beyond trial offer will result in extra fees. Some features charged for separately. Credit card required. Phone charges may apply. Limited time offer subject to change and orders are subject to acceptance. Please allow approximately two weeks for shipment of your PRODIGY® software. The offer is available to new members only and is limited to one person per household.

PRODIGY® Service

Get product reviews, downloadable software and more from Ziffnet for PRODIGY.

Nobody makes the Net easier than PRODIGY.

The **Net** is sizzling and there's no better way to surf it than with **PRODIGY's New Web Browser for Windows.**® Explore the exploding **World Wide Web** with **full multimedia capabilities** including audio and images.

Exchange opinions and information with 20 million people around the world (all of whom will probably become close personal friends) with Internet **Usenet Newsgroups.**

Send an **E-Mail** to Kansas City, Kentucky, Kashmir and Kamchatka. (You can also send E-Mails to places that don't start with a K.)

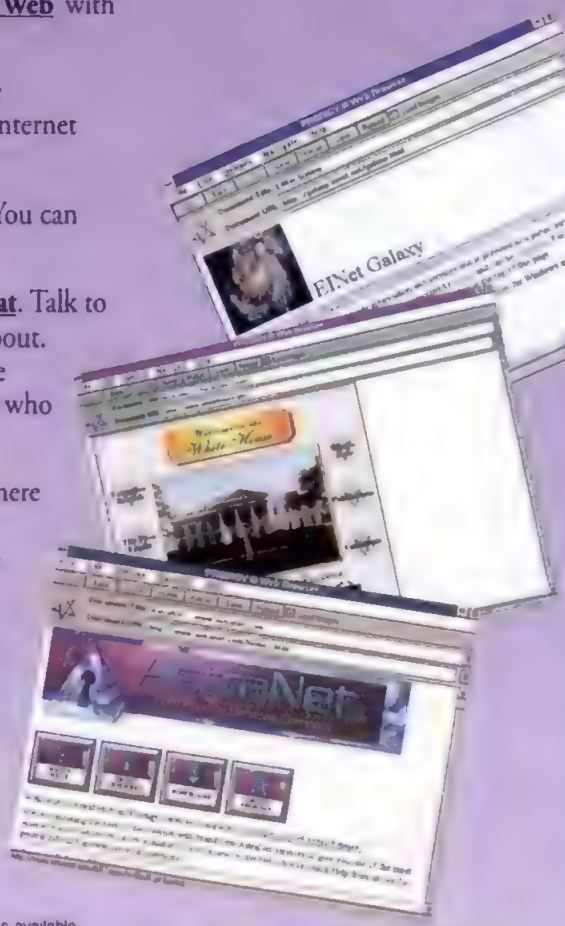
When you've had enough of the Net, settle into the best **Real-Time Chat**. Talk to people who care about what you care about no matter what you care about. PRODIGY Chat also gives you the chance to talk up the Bigwigs in the Cyberbiz—magazine editors, columnists and the other thought leaders who have those cushy jobs and lunch a lot.

You also have to check out PRODIGY's new *Communities of Interest** where everything you want to know and everybody you want to talk to on a specific topic are all in one place. (Pretty convenient, huh?) Topics range from genealogy and games to computers and movies.

There's no extra charge for **high speed access**. (Why should we penalize you for having a better modem?) And **14,400 bps** is available in most areas to placate New Yorkers and other really impatient types.

Some stuff you'll find **Only on PRODIGY** and nowhere else. Good stuff like Strategic Investor,℠ Sports Illustrated for Kids and more.

Try us for **10 free hours**. 'Cause if you haven't tried PRODIGY lately, you haven't tried PRODIGY.



*Communities of Interest are scheduled for availability in the Spring of 1995. The PRODIGY Web Browser is available only for Windows® Windows is a registered trademark of Microsoft Corporation. PRODIGY is a registered trademark of Prodigy Services Company © 1995 Prodigy Services Company

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST-CLASS MAIL/PERMIT NO. 98/JOHNSON CITY, TN

POSTAGE WILL BE PAID BY ADDRESSEE

PRODIGY Service
PO BOX 8667
GRAY TN 37615-9967

To get your 10 free hours

Call us at 1-800-PRODIGY. But before you call, you should check your screen because you may already have the PRODIGY software on your computer. If you prefer to E-Mail us, our address is getlive@prodigy.com . And you can also download the software right off the WWW location: www.astranet.com . After your 10 free hours, PRODIGY is only $9.95 for five hours.

Call 1-800-PRODIGY ext. 509

PRODIGY® Service

al DOS memory, a name borrowed from the Windows API function used to allocate space there—GlobalDosAlloc.) If global DOS memory is so full that there's no more room for TDBs, Windows 3.1 will refuse to start additional programs even if free memory above 1MB and free system resources are plentiful.

TDBs and PSPs are still used in Windows 95. TDBs have been moved out of global DOS memory, but PSPs haven't. So it's still possible to encounter out-of-memory errors when there is no shortage of free memory. Fortunately, such situations should be rare. Windows 3.1 took steps to alleviate this problem (which was sometimes quite severe in 3.0) by transparently fulfilling most memory requests that formerly allocated global DOS memory with memory located above 1MB. Windows 95 improves the situation further by moving TDBs out of global memory, but it's still a hack rather than a genuine fix.

THE VFAT FILE SYSTEM

One of an OS's most important jobs is to manage data on hard and floppy disks. Typically this is done by generalizing the interface to the system's mass-storage devices and permitting applications to address files rather than individual sectors on the disk. When an application writes data to a file, the OS writes the data to the disk and creates a record of where it is stored. Knowing the filename, the application can later open the file and read the data back. The application neither knows nor cares how the data is physically stored; the details are handled by the OS.

Until Windows NT came along, Windows had no file system of its own. Instead, it relied on the DOS file system, which used a simple method of organizing files on a disk that centered around an on-disk data structure called the file allocation table (FAT). The FAT file system was adequate in the days of real-mode OSs and 10MB hard disks, but it has outlived its usefulness. Its greatest drawback is that it limits filenames to eight characters plus a three-letter extension. And when the file-system code resides in DOS, as it does today, Windows must kick out of protected mode every time it accesses a file. Clearly an OS that wishes to compete with the likes of Windows NT and OS/2, which support high-performance native file systems, must replace the FAT file system with one of its own.

Windows 95 addresses these concerns with a new file system that is basically an extension of the FAT file system called virtual FAT (VFAT). VFAT is a 32-bit file-system driver that sits under the IFS manager in ring 0. The driver borrows heavily from the 32-bit file-access code in Windows for Workgroups 3.11 to provide a mostly protected-mode path to a disk and back. It also supports long filenames (up to 255 characters each) and maintains backward compatibility with FAT volumes.

Such a feat of magic is accomplished by recording two names—one long and one short—for each file, chaining 32-byte directory entries together to hold the long filenames and hiding these directory entries by marking them with an "impossible" combination of hidden, system, read-only, and volume label attribute bits. The short filename, or *alias*, is generated by truncating the long filename. DOS and Win16 apps see only the short filename; Win32 apps see the long version.

VFAT seems like an ideal compromise but suffers from many of the same limitations as the FAT file system.

In some ways, it seems an ideal compromise. End users get the long filenames they've been waiting for, plus faster disk accesses and an easy upgrade path from FAT volumes. The long filenames work pretty well if you are careful not to modify a directory entry with a 16-bit app. If this happens, you can lose the long filename.

VFAT suffers, however, from many of the same limitations as the FAT file system. The size of the root directory is still fixed once the disk is formatted, so its capacity to hold file and subdirectory names is limited. The fixed size is even more constraining on a VFAT volume because every file (and subdirectory) requires at least two 32-byte directory entries—often more, depending on the length of the filename. The 16-bit limit on VFAT entries means that large hard disks require large cluster sizes (potentially reducing their storage efficiency) and that VFAT volumes are practically limited to about 2GB. Also, long filenames aren't visible until after the file-system driver is loaded, so long filenames can't be used during the boot process (say, in a CONFIG.SYS or AUTOEXEC.BAT file).

How does VFAT compare to OS/2's HPFS and Windows NT's NTFS file systems? HPFS and NTFS are much more sophisticated file systems designed for high performance, large hard disk capacities (up to 2 terabytes for HPFS and a mind-boggling *68 billion* terabytes for NTFS), greater storage efficiency, and greater reliability. NTFS is somewhat more sophisticated than HPFS. In particular, NTFS uses a transaction-based processing model that makes it possible to recover in a matter of minutes from just about any type of file-system error—even hard crashes resulting from power failures. Both HPFS and NTFS are light years beyond VFAT.

On one hand, VFAT is compatible with existing disk volumes and disk repair utilities; this is a huge plus for the installed base of more than 50 million Windows users, most of whom could care less about the nuts and bolts of file-system operation. On the other hand, it is an outdated file system on crutches. It's too bad Windows 95 users won't be offered the choice of making a clean break with the past.

STABILITY

Almost every Windows user has experienced mysterious crashes that bring down an application and sometimes the entire system. Most of these crashes are due not to inherent flaws in the OS, but to buggy applications and device drivers. Video drivers are particularly notorious, as evidenced by the driver-of-the-week upgrades put out by many video board makers. These drivers are both a blessing and a curse: They enable Windows to work with a wide range of hardware, but they're so difficult to write that one can never be confident that all the bugs are gone.

One of the ways Windows 95 seeks to increase reliability is by decreasing the load on the independent hardware vendors (IHVs) who write the drivers. Borrowing a page from the design of printer drivers in Windows 3.1 and disk drivers in Windows NT, Microsoft has modified the disk- and

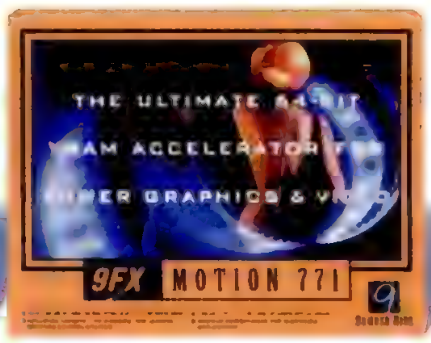
WANT A GRAPHICS ACCELERATOR?

CALL 1-800-438-6463

DON'T THINK YOU WANT ONE?

CALL 1-800-438-6447

(WE'LL SEND YOU THE "9 WAYS AN ACCELERATOR WILL IMPROVE YOUR PC PERFORMANCE".)



THE NEW 9FX™ SERIES.

PERFORMANCE RAISED TO THE POWER OF 9.

NUMBER NINE
VISUAL TECHNOLOGY

9FX, 9FXVISION, 9FXMOTION, NUMBER NINE LOGO ARE TRADEMARKS OF NUMBER NINE VISUAL TECHNOLOGY. ©1995 NUMBER NINE VISUAL TECHNOLOGY.

CIRCLE 259 ON READER SERVICE CARD

display-driver model in Windows 95 so that a driver's core functionality is provided by a VxD written by Microsoft. Hardware-dependent functions supplied by the IHV are localized in a *minidriver* that works in tandem with the VxD. Windows calls the VxD, and the VxD, when necessary, calls the minidriver. This simplifies the code that the IHV writes and therefore reduces the likelihood of error.

Other improvements designed to heighten reliability include the private address spaces allocated to Win32 apps, better parameter validation when system services are called, and, for the first time, parameter validation for VxDs. Parameter validation is the simple act of verifying that parameters passed through function calls contain legal values that won't wreak havoc with the system. Users of DOS apps may now click a check box in a property sheet and acquire better protection of conventional memory, always a soft spot because some of the code and data stored there is global to all virtual machines.

How well does the protected memory feature work? Not very well—at least not yet. Here's a simple experiment to try if you don't mind crashing your system. Open a DOS window and type DEBUG to start the DOS debugger. At the hyphen prompt, type

F 0000:0000 FFFF 66

This command overwrites the first 64K of memory with the arbitrarily chosen hexadecimal value 66. In Windows 3.1, this locks up the system, forcing a reset. Windows NT and OS/2 recover gracefully, allowing you to close down the DOS box. (In OS/2, make sure you're running DEBUG in a window; otherwise, you might not be able to switch back to the shell and close the DOS session.) In the beta 2 release of Windows 95, whose handling of low memory is much like Windows 3.1's, you also get a complete lockup—even if memory is marked "protected."

This could be fixed before Windows 95 is released, but for now it's evidence that Windows 95 is not the rock-solid performer some claim it to be. The burden still falls on applications developers to deliver safe and reliable products.

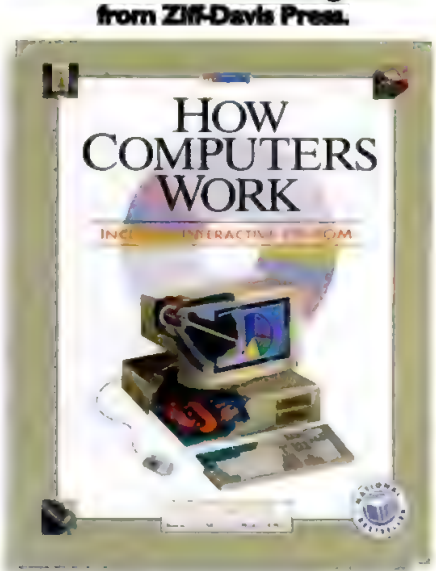
A LITTLE OLD, A LITTLE NEW

In general, Windows users will find Windows 95 to be a more robust and pleasing environment in which to run their favorite programs. The multitude of enhancements that sit on top of the base architecture—the redesigned user interface, better networking support, and easier configuration—will help to make it so. Microsoft has borrowed some of the best aspects of Windows 3.1 and built on that foundation to produce an OS whose exterior bears little resemblance to the Windows of years past but whose interior looks more than a little familiar.

Is Windows 95 a 32-bit OS? Not by the strictest of definitions, since it contains some residual 16-bit code. But it runs 32-bit applications and does everything else a 32-bit OS is supposed to do. In the final analysis, what will decide the success or failure of this OS is not the minutiae of its implementation, but how well it runs applications, how enthusiastically software developers support it, and how reliably it performs. Everything else is just noise. □

Click Click.

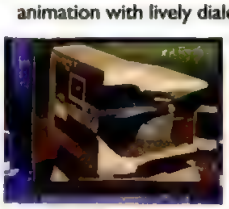
PC/Computing How Computers Work CD-ROM/Book extravaganza from Ziff-Davis Press.



ISBN: 1-56276-250-8 Price: $39.95

Click your way through an electrifying multimedia voyage to the heart of the computer with *How Multimedia Computers Work*—a unique CD-ROM packaged with the classic best-selling book *PC/Computing How Computers Work*.

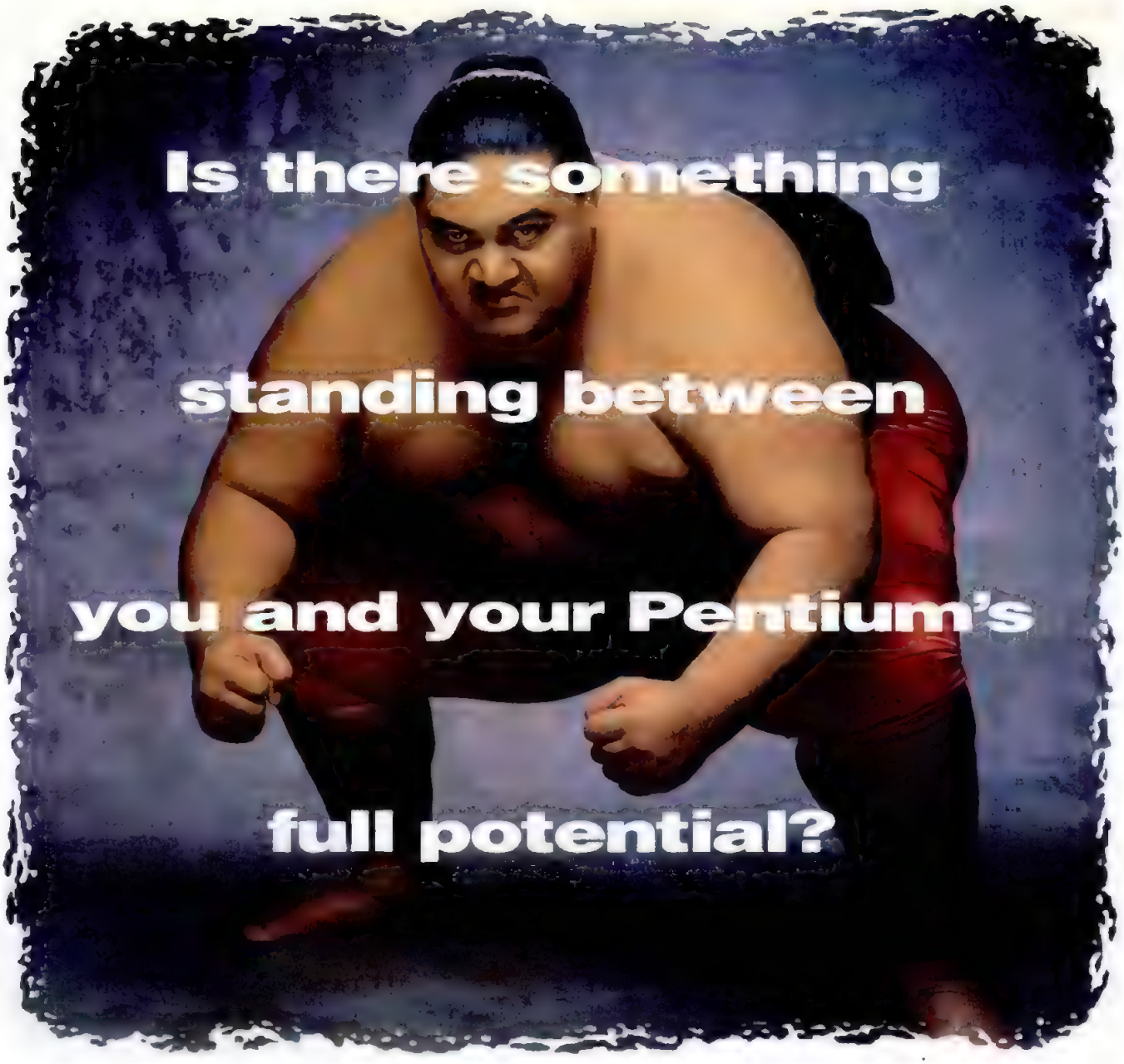
In *How Multimedia Computers Work*, fun, fast-paced, fascinating tours of your computer's incredible innards combine state-of-the-art 3D animation with lively dialog and music for a richly interactive sensory feast. Also included are provocative video interviews with well-known computer industry figures—plus tons of computing tips from the top authors at Ziff-Davis Press. Teamed up with a book that has already shown legions of computer users what makes their machine tick, *How Multimedia Computers Work* is a real whiz-bang experience that's sure to make you see your computer in a whole new light. Ask your favorite bookseller for *PC/Computing How Computers Work* with *How Multimedia Computers Work* on interactive CD-ROM.



WHIZ

BANG

Ziff-Davis Press books are available at all fine bookstores, or call 1-800-688-0448, ext. 226.



Pentium has the potential. SCSI unleashes the power.

Sometimes the I/O bottleneck can look pretty intimidating. But don't give up. You only need two things to get around this little obstacle: a PCI local bus and SCSI-based peripherals. Most Pentium PCs are already shipping with PCI so all you need is SCSI.

Here's what the experts are saying about SCSI and PCI:

"If you've got a PCI-based PC or server, you want the fastest SCSI peripherals... the ease of installation and potential for high performance make PCI SCSI a natural for intensive I/O applications."

— PC Magazine, 6/28/94 "The Perfect PC"

IOware® products from Adaptec bring SCSI connectivity, performance and reliability to Pentium PCs running I/O-intensive server and desktop applications. Like multitasking applications running under Windows 4.0 and OS/2. Or multimedia applications with huge storage demands. SCSI can connect up to seven peripherals including CD-ROM drives and mass storage hard drives while maintaining overall system performance.

Adaptec IOware PRODUCTS

It's pretty simple actually, Pentium is the fastest processor, PCI is the fastest bus and SCSI is the fastest, most flexible I/O technology.

Call 1-800-934-2766 and ask the SCSI I/O leader about the PCI SCSI Master™ kit free evaluation offer. Because with a neck size this big, you'll need more than a good half-nelson.

adaptec®

I/O. NOW MORE IMPORTANT THAN EVER.

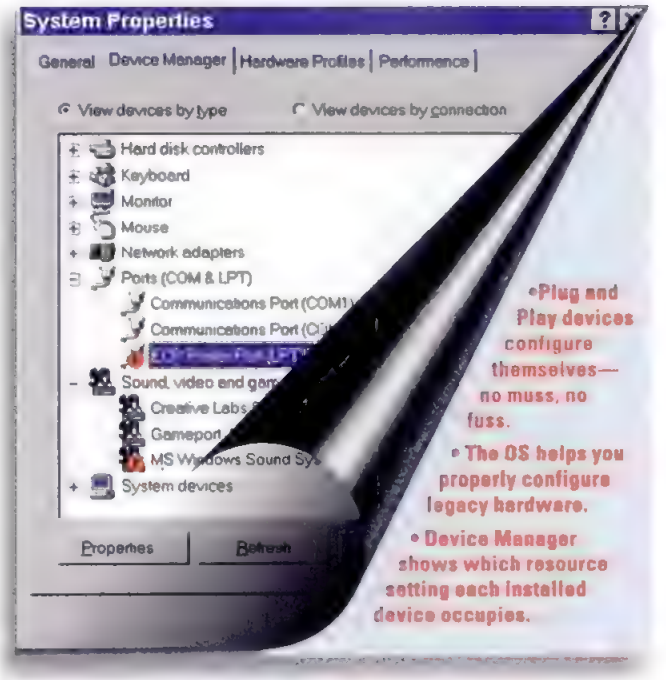
Call **1-800-934-2766** to qualify for a free 45-day evaluation of the PCI SCSI Master kit* and our primer "Wrestling With The I/O Bottleneck."

* Offer good in the U.S. and Canada only. Supplies are limited. PCI SCSI Master kit includes AHA®-2940 host adapter, software and cable. © 1994 Adaptec, Inc. All rights reserved. Adaptec, the Adaptec logo, IOware, AHA and PCI SCSI Master are trademarks of Adaptec, Inc. which may be registered in some jurisdictions. All other trademarks are owned by their respective owners.

CIRCLE 117 ON READER SERVICE CARD

PLUG AND PLAY

Plug and Play support integrated into Windows 95 promises to bring order to the chaos of adding new devices to your system. But if you're using legacy hardware, it's not exactly Shangri-La.



Effortless Upgrades

Microsoft is nothing if not ambitious. Among a multitude of enhancements, Windows 95 promises a solution to one of the thorniest problems facing PC users today: How to make installing peripherals in your PC as easy as adding components to a stereo system.

You've probably encountered the problem firsthand. A PC upgrade can turn into a game of "What's My Line" as you try to figure out which devices need which DMA channels, IRQ lines, I/O port assignments, and memory-address ranges; which of those limited resources are currently used by other devices; and how you can juggle them all to eliminate conflicts. Multimedia upgrade kits are among the most notorious offenders, but hardware and software manufacturers alike will attest that the problem permeates the PC industry.

Past attempts to regulate the PC architecture have generally proved ill-fated. EISA, originally promoted by Compaq and the so-called Gang of Nine, offered automatic configuration of EISA cards and compatibility with ISA products, but it never made significant inroads except in servers and Compaq desktop systems. IBM's technically impressive Micro Channel architecture, with its own automatic configuration features, is all but disappearing from the map. And although PCI and PCMCIA provide some automatic configuration capabilities, neither standard answers the truly critical compatibility question: how to support the thousands of existing legacy ISA expansion cards.

By John Clyman and Nick Stam

IN THIS SECTION

PnP in Windows 3.1, NT, and OS/2 160
Plug and Play Product Roster 166
Setting Up Your Hand-Me-Downs 170

Illustration by Jaime Beauchamp

INTRODUCING—PLUG AND PLAY

Windows 95 will include support for *Plug and Play (PnP)*, a set of frameworks promoted by Microsoft, Compaq, Intel, and BIOS manufacturer Phoenix Technologies that aims to alleviate PC configuration problems. The standards, which were first proposed in January 1993, are intended to make device configuration entirely automatic and transparent—just plug in a new device and you're up and running.

PnP's ultimate goal: No more device conflicts; no more fiddling with jumpers, tweaking CONFIG.SYS files, or even loading device drivers. This benefits not only users but also vendors by dramatically reducing volume of costly technical support calls they must field. PnP also demands that device drivers support dynamic reconfiguration, forming a foundation for capabilities like PCMCIA hot swapping (which allows you to swap PCMCIA cards without rebooting your notebook), notebook hot docking (enabling the notebook to link with or unlink from devices in a docking station without rebooting), and wireless file exchange. PnP enjoys broad promises of support in the industry (although relatively few products are actually shipping today), and from a hardware perspective it's extremely inexpensive to implement.

While our testing of early Plug and Play products demonstrated their promise, it's also clear that PnP faces tremendous obstacles, particularly when it comes to handling legacy (that is, non–Plug and Play) ISA cards. Automatic identification of legacy cards is likely to remain spotty at best, and until the entire industry implements PnP capabilities, users will still require education about IRQs and DMAs and need to be comfortable setting DIP switches and jumpers.

TRUE PLUG AND PLAY

In theory, a complete PnP solution will automatically configure virtually every device inside your system: motherboard-mounted controllers, ISA cards, SCSI devices, displays, printers, and more. Such a solution requires a number of PnP components.

First, your system must have a PnP-ready BIOS, flexible enough to resolve any potential conflicts between the devices required to boot the operating system. PnP BIOSes from all three major BIOS vendors (Phoenix, AMI, and Award) are already shipping in many systems, including those from Dell, Digital, Gateway, and Packard Bell. By mid-1995, we expect most systems to ship with PnP BIOSes.

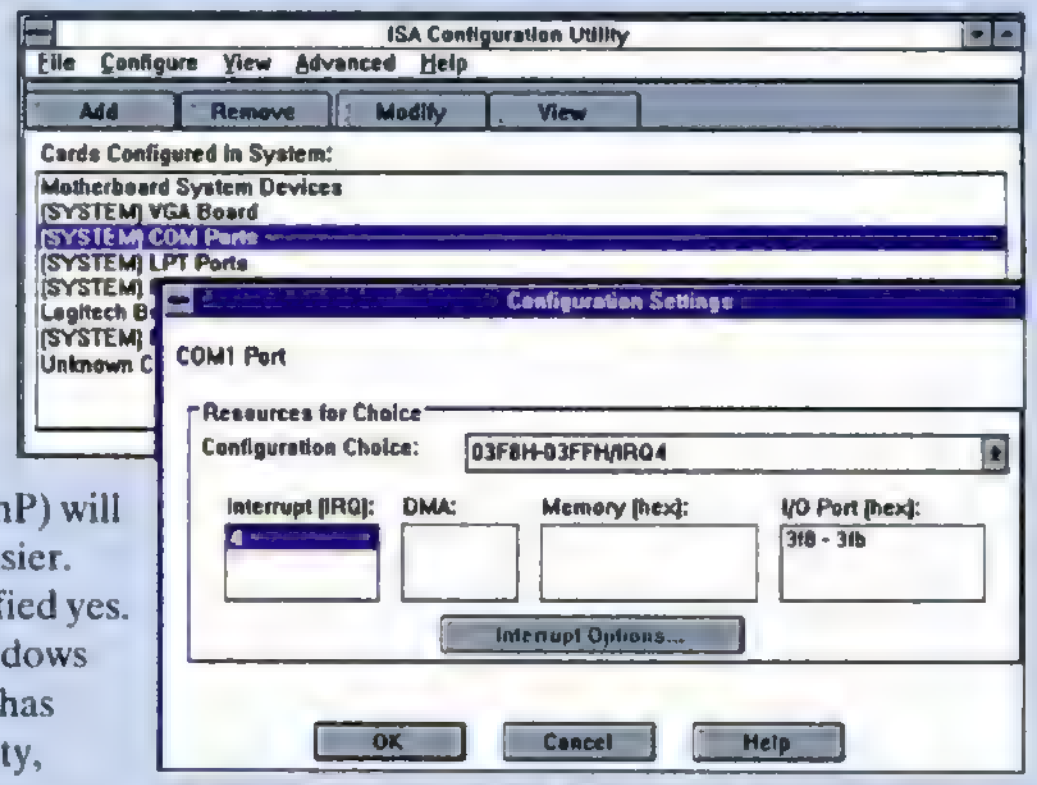
You must also install a Plug and Play–capable operating system, whether it be Windows 95 or something else (see the sidebar "Plug and Play in Windows 3.1, NT, and OS/2" for a discussion of Plug and Play capabilities in other operating systems). The PnP-capable OS maintains structures that track the devices installed in the machine and their use of resources.

Finally, all your expansion devices and device driver software must also support the Plug and Play standard: Peripherals vendors have to add logic to their devices to support PnP and to write device drivers to support dynamic reconfiguration. Dynamic reconfiguration even affects application developers, who might want a communications package to ask whether you'd like to send pending messages before letting you eject a PCMCIA fax/modem, for instance. Several PnP expansion cards have already begun to ap-

PnP in Windows 3.1, NT, and OS/2

By M. David Stone

Installing Plug and Play peripherals promises to be a snap if you're running Windows 95, and installing legacy boards is likely to be easier than you're used to. But Windows ninetysomething isn't here yet. And you may not be in a rush to move to it anyway—particularly if your preferred operating system is OS/2, Windows NT, or straight DOS. The question, then, is whether the Plug and Play standard (PnP) will still make your life easier. The answer is a qualified yes.



The ISA Configuration Utility dialog boxes assume that you understand IRQ, DMA, memory address, and I/O port settings.

For DOS and Windows 3.1 users, Intel Corp. has developed a PnP utility, called ICU (ISA configuration utility), that comes close to but doesn't quite match the PnP support in Windows 95. It doesn't automatically load drivers for PnP cards, nor does it recognize most non-PnP cards. But when you install a PnP card, it does work to resolve resource conflicts automatically. In addition, it helps you configure legacy devices and keeps a record of the resources being used by both PnP and legacy devices. It also supports PnP for PCMCIA.

ICU comes with both Windows 3.1 and DOS programs for managing configuration information, and with Configuration Manager, which uses the stored information to configure PnP cards.

ICU will control resources for PCI cards as well. Intel expects ICU to treat existing VL-Bus cards in much the same way it treats legacy cards but hasn't yet tested it with VL-Bus cards. For our tests, Intel provided ICU, Version 1.21.

HOW IT WORKS

Whether your system has a PnP BIOS or not, the first step for using ICU is to install the ICU program for DOS, Windows, or both. In non-PnP systems, you then run a DOS program, CASSIST, that tries to determine the IRQs,

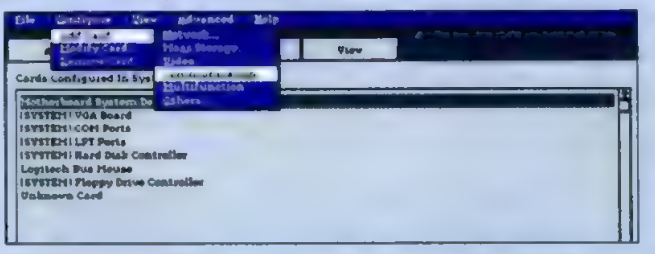
DMAs, memory addresses, and I/O ports for each device installed in your system. CASSIST then writes the information to a file that goes in the root directory on your hard disk. Unfortunately, there are some devices that you can't easily find with software. So the next step is to run ICU, check what CASSIST found, and (based on what you know about your system) make the corrections and additions manually.

Changing legacy card settings in the ICU is straightforward, using reasonably self-explanatory dialog boxes in both DOS and Windows. The two programs have a similar design, with the DOS program offering a fair imitation of a Windows look and feel. Unfortunately, however, you not only have to know about IRQs, you have to know the current settings for the cards in your system.

If you have a PnP BIOS, you don't have to run CASSIST. The BIOS automatically finds PnP boards and system resources such as COMM ports, and the system vendor should have set up the information for any legacy boards installed in the system before shipping.

Plug in a PnP card, such as the Future Domain PNP-1630 SCSI card that we used in our tests, and the Configuration Manager, like Windows 95, finds and configures the card on boot-up. In contrast to Windows 95, however, before you can use a CD-ROM drive on the card, you have to add an MSCDEX device line in AUTOEXEC.BAT, then install the Future Domain driver manually.

To install a legacy card, you run ICU, click on the Add button, and choose one of the categories (Network, Mass Storage, Video, and so forth) in Intel's database of 269 cards.



The DOS version of ICU sports a graphical interface that imitates Windows' look and feel.

If the card is in the database and its default settings are available, you choose it, and ICU will add the card to its list of installed cards. If the default settings are already being used by other devices but alternate settings are free, ICU will tell you to install the card with other specified settings. If none of the IRQ, DMA, or other resources your card supports are free, ICU will warn you of the conflict but will not tell you what to do. It's up to you to juggle settings on other cards to make room for the new one and then let the configuration know the new settings.

As should be obvious, the legacy card configuration process is far from idiot-proof—and a long way from PnP's promise of automatic installation. A more serious drawback to ICU is that it won't let you share resources. That means you're barred from such common choices as installing your sound board and printer port to use the same IRQ, or installing four COMM ports with COM1 and COM3 sharing one IRQ and COM2 and COM4 sharing the other. Intel says it may allow sharing in a future version.

OS/2 Warp, Version 3 users already have a built-in feature called Plug and Play for PCMCIA. As with ICU's PCMCIA Plug and Play, this works much like PCMCIA utilities for DOS but offers improved resource management for avoiding conflicts in desktop systems.

OS/2 also manages resources for adapter cards in a way that is similar but not identical to Intel/Microsoft's Plug and Play. Missing from OS/2 today is a database of ISA cards that helps you manually specify the right resources for legacy cards. Also missing is the ability to automatically configure PnP cards. Both features are promised for the indefinite future, with Jeff Howard, Worldwide OS/2 brand manager, saying only that when PnP peripherals are available in quantity, OS/2 will support them.

Windows NT 3.5, finally, does not support Plug and Play at all. Current plans are for the next version of NT, slated for a late 1996 release, to support the full range of Plug and Play features in much the same way that Windows 95 does. □

pear on the market (see the table "Plug and Play Product Roster").

In the immediate future, Plug and Play will provide the fullest solution for buyers of new machines with new PnP-compliant boards. But it turns out that you can reap partial benefits from PnP features even if you don't have all the pieces in place on your machine.

WHAT IT'S LIKE

Our experiences in testing ISA Plug and Play support under a beta version of Windows 95 in various scenarios were generally positive. We did run into problems and conflicting messages at times, but most functions worked as specified. It was too early to make any conclusions about the problems we encountered since we were working with a prerelease package.

Here is a snapshot of what we found. Keep in mind that changes in the way configuration is handled are still possible.

Adding a PnP ISA device to a machine with a PnP BIOS. In this best-case scenario, the machine should be able to handle device configuration without any user intervention at all. That's exactly what happened when we installed an NEC 501 quad-speed CD-ROM drive and a Future Domain PNP-1630 SCSI card in a Digital Equipment Corp. Celebris 590 PC with Phoenix Technologies' PnP BIOS. When we booted the system, it automatically detected the addition of the PnP SCSI card and enabled both the card and the CD-ROM drive. We didn't even have to load drivers from a floppy disk.

We also found that Windows 95 was able to identify and configure two other

James Bond.
Your ThinkPad is ready.

The 9.7" wide case

The bad guys will never know there's a hidden phone inside

Record your own communique on the built-in answering machine.

and they won't have a clue

cleverly conceals

When the very survival of the world is at stake, go for the big 10.4" diagonal color display.

When trouble arrives, slip the removable 540MB hard drive quietly into your pocket.

Transfer covert data to other agents with wireless infrared technology.

a full-size keyboard.

IBM PC Direct prices and offering are subject to availability or withdrawal. Prices/offerings in Canada may vary. Remarketer prices may vary. Shipping and handling charges are extra. *Weight varies based on variance in components and manufacturing process. **Assembled in the U.S. of U.S. and non-U.S. components. [1]*PC Magazine* 3/14/95, pg. 38. [11]Upon registration, International Warranty Service is available for those customers travelling or relocating to countries where this product is sold and serviced by IBM or IBM Authorized Dealers. [1]Please call 1 800 426-7255 for details on IBM's money-back guarantee and limited warranty. Copies available upon request. [2]MB equals one million bytes; accessible capacity depends on operating system environment. [3]IBM ThinkPad EasyServ is available in the U.S. and Canada during the warranty period. [4]Excluding some holidays. [5]IBM Credit Lease

James Bond, as a frequent traveller, will certainly carry this amazing 4.5 lb.* ultra portable computer on his next mission. Concealed inside, you'll discover the revolutionary full-size TrackWrite™ keyboard that automatically unfolds. A 10.4" active matrix color screen (dual scan display also available). And to keep in touch with the home office, the 701C** doubles as a full-function speakerphone, answering machine and fax. So much technology, in fact, that *PC Magazine*† claims the innovative 701C "sets the new notebook standard for others to match." But not even Mr. Bond would travel without backup. That's why IBM HelpWare® provides toll-free voice support, 24 hours a day, 7 days a week,[5] during the 3-year limited warranty period[1] and International Warranty Service.†† Best of all, acquiring this extraordinary device is not a difficult mission. Just call IBM PC Direct,™ and be sure to enter the secret code below.

Memorize this dossier before you go on your next mission. (then eat the page)

The new IBM ThinkPad 701C. Created for the 007 in all of us.

as to how you received that secret fax.

?

"Dear James, you're on, meet me in Copenhagen."
–Agent 005

The ThinkPad 701C at a glance

This 701C notebook includes

- IntelDX4™ 75 MHz processor
- TrackWrite™ expanding full-size keyboard with 85 keys and TrackPoint III™ with Quick Stop response and non-slip cap
- 8MB RAM (up to 24MB)
- Weighs about 4.5 lbs*
- 540MB[2] removable hard drive
- 10.4" (measured diagonally) TFT active matrix color display
- Internal 14.4 Kbps data/fax modem, telephony functions with built-in full-duplex speakerphone and digital answering machine
- Integrated infrared wireless file transfer, synchronization and printing
- Two PCMCIA Type I or Type II cards or one Type III
- A host of useful software applications. Lotus® Organizer™ and SoftNet FaxWorks Voice™ and 15 other applications come preloaded, along with IBM PC DOS 6.3, OS/2® Warp and Windows™ 3.11.

For HelpWare service and support

- 3-year limited warranty with International Warranty Service†† and ThinkPad EasyServ™ courier repair service[1]
- 30-day money-back guarantee from IBM PC Direct[1]
- Toll-free voice support, 24 hours a day, 7 days a week[4]
- Problem determination, setup and usage assistance for hardware and pre-installed DOS, Windows or OS/2.

Call us, we're open 8am–10pm Monday–Friday, 9am–5pm Saturday (Eastern Standard Time)

IBM Credit Lease $191/mo[3]

$5,649

Call us. It's that easy.

IBM PC DIRECT 1 800 426-7255

Enter source code 4911

prices are quoted for 36-month terms. Lease rates quoted are good through 5/31/95, after which time rates are subject to change without notice. Lease available to qualified commercial customers only. IBM, ThinkPad and HelpWare are registered trademarks, and ThinkPad, EasyServ and TrackPoint III are trademarks of International Business Machines Corporation. All other brands and product names are registered trademarks, trademarks or service marks of their respective holders. Windows is a trademark of Microsoft Corporation. Third party software programs listed are licensed to customers under non-IBM software vendor's terms and conditions provided with the package. IBM makes no representations or warranties regarding non-IBM software. PC Direct is a trademark of Ziff Communications Company and is used by IBM under license. ©1995 International Business Machines Corporation.

We put a technical expert

Now, your PC will be easier to use than ever before. IBM PC Direct™ has loaded every IBM PC 300* with helpful features and software from diagnostics to modern communications functions.

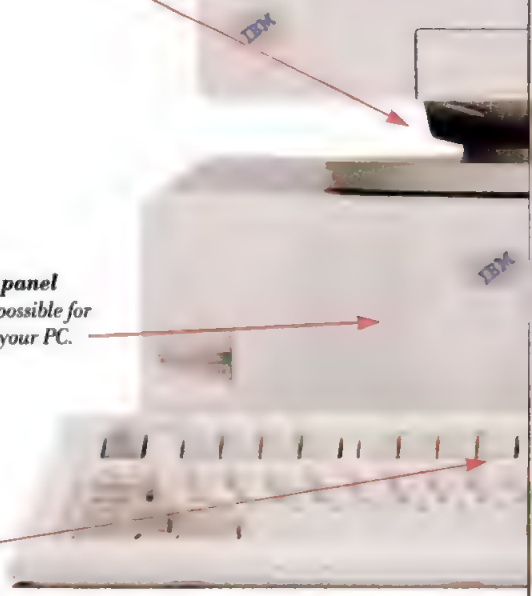
Service and support are easier than ever with IBM Online Housecall. It's a preloaded application that connects your PC directly to the 24-hour IBM HelpCenter® (modem required). From there, specially trained IBM technicians go online with your PC. They analyze your files and hardware, and usually take care of everything.

- Your preloaded software includes an ***easy-to-use*** tutorial. It takes you through diagnostics, automatic scheduling and more.
- You'll quickly and easily use features like IBM's exclusive Rapid Resume,™ with scheduling features for unattended automatic printing, backups and more.
- Have your system "wake up" at a preset time, ***turn itself on***, and get ready for a fax. Or it can run an application unattended and fax the output back to you.
- You can change your monitor's resolutions and color capability on the fly. No need to reboot, even in Windows.™ Try doing that on one of our competitors.
- Our built-in power management software can save you money. (We're Energy Star compliant,†† of course.) And our Plug and Play configuration software makes adding on to your system easier than ever.
- NetFinity™ makes it easy to track the state of your system, monitor, memory and more.

At IBM PC Direct, your PC 300 comes with ***3-year limited warranty****[1] including parts and labor for all 3 years and 1 year of onsite service.*[3]

There are two graphic power capabilities– ***32-bit local bus*** *graphics on 486 models or* ***64-bit local bus*** *graphic on Pentium models.*

On the Desktop models our local bus enhanced IDE controller allows you to connect up to ***4 hard drives of 1GB each.***



The sliding ***security panel*** *makes it virtually impossible for someone to go inside your PC.*

Every IBM PC Direct purchase comes with a ***30-day money-back,*** *no-questions-asked guarantee.*[4]

At IBM PC Direct, you can count on IBM HelpWare® for service and support.

- Via telephone with our 24-hour toll-free voice support
- Via modem on our 24-hour bulletin board service
- Via fax, with our 24-hour toll-free fax-back service

IBM®

IBM PC Direct prices and offerings are subject to availability or withdrawal. Prices/offerings in Canada may vary. Remarketer prices vary. Shipping and handling charges are extra. [1]IBM Credit Lease prices are quoted for 36-month terms. Lease rates quoted are good through 5/31/95, after which time rates are subject to change without notice. Lease available to qualified commercial customers only. [2]When referring to hard drive capacity, MB stands for 1,000,000 bytes; total user-accessible capacity may vary slightly based on operating system environment. [3]At no additional charge during warranty period. Onsite service for first year of warranty available Monday-Friday 8am-5pm in your time zone. Second and third year is customer carry-in service. [4]Please call 1 800 426-7255 for details on IBM's money-back guarantee and limited warranty. Copies of limited warranty available upon request. *Upgradable with Intel's OverDrive™ processor based on Pentium processor technology. **EPA, as a matter of policy, does not endorse any particular company or its products. Energy Star compliant configurations are available. Ask your Sales Representative. *Assembled in the U.S. of U.S. and non-U.S. components. IBM and HelpWare are registered trademarks, and Rapid Resume is a trademark of International Business Machines Corporation. All other brands and product names are registered trademarks, trademarks or service marks of their respective holders. Windows is a trademark of Microsoft Corporation. Software programs listed are licensed to customers under non-IBM software vendor's terms and conditions provided with the package. IBM makes no representations or warranties regarding non-IBM software. PC Direct is a trademark of Ziff Communications Company and is used by IBM under license. ©1995 International Business Machines Corporation.

in every IBM PC 300.

The perfect PC starts with CustomerFit: a PC that's built to fit the way you work, and the life you live. That's why we begin every phone call by ***listening to you.*** *At IBM PC Direct, CustomerFit insures a complete IBM Personal Computer system that's perfect for you.*

Selectabus gives you your choice of VESA/ISA or PCI/ISA local bus architecture. Later on, if you want to change your mind and change your local bus, ***it's easy and economical.***

The IBM PC 300 is ***PCMCIA enabled.*** *(With optional adapter shown.) If you use a laptop too, you'll appreciate the convenience and flexibility this offers.*

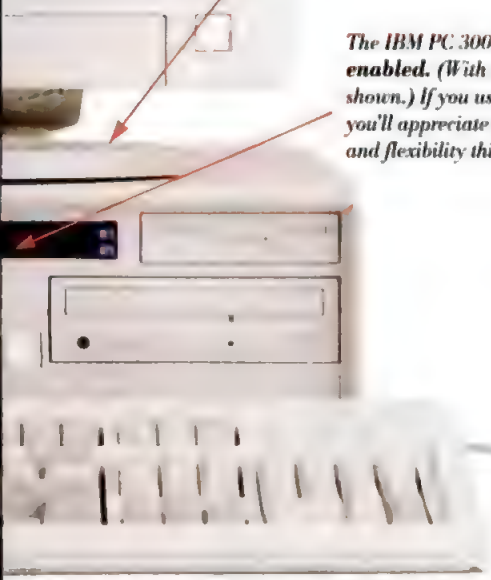


Photo shown with enhanced keyboard and 15V color monitor.

IBM PC 300 SpaceSaver	IBM PC 300 Desktop	IBM PC 300 Pentium
For more power: • an Intel® 486 processor chip • Math coprocessor • Upgradable to 256KB L2 cache • Enhanced IDE 270MB² HD (upgradable to 1GB HD) • 4MB RAM (expandable to 128MB) • VESA local bus (upgradable to PCI with Selectabus) • 32-bit VESA local bus graphics	***More power:*** • an Intel 486 processor chip • Math coprocessor upgradable to • 256KB L2 cache • Enhanced IDE 364MB² HD (upgradable to 1GB HD, expandable to 4 drives) • 8MB RAM (expandable to 128MB) • VESA local bus (upgradable to PCI with Selectabus) • 32-bit VESA local bus graphics	***More power:*** • an Intel Pentium™ 60MHz processor chip • Math coprocessor • 256KB L2 cache • Enhanced IDE 540MB² HD (upgradable to 1GB HD, expandable to 4 drives) • 8MB RAM (expandable to 128MB) • PCI local bus • 64-bit PCI local bus graphics
For expansion needs: • A SpaceSaver configuration with 3 slots, 3 bays	***For expansion needs:*** • A full Desktop configuration with 5 slots, 5 bays	***For expansion needs:*** • A full Desktop configuration with 5 slots, 5 bays
New lower prices: 450/DX2 **$1574** IBM Credit Lease $53/month¹ 466/DX2 **$1666** IBM Credit Lease $56/month¹ 100/DX4 **$1862** IBM Credit Lease $63/month¹	***New lower prices:*** 450/DX2 **$1891** IBM Credit Lease $64/month¹ 466/DX2 **$1983** IBM Credit Lease $67/month¹ 100/DX4 **$2179** IBM Credit Lease $74/month¹	***New lower prices:*** Pentium 60 **$2821** IBM Credit Lease $96/month¹
		Additional options: • IBM Enhanced 101-Key board and Mouse, add $40 • 1MB(2) video memory upgrade Pentium 60, add $95 • Internal CD-ROM drive, add $199

Also standard on every IBM PC 300 mentioned above:

- 14V Color Monitor with a maximum diagonal viewable screen size of 13"
- 1MB video memory
- Upgradable to future Pentium technology³ or Intel chip
- IBM basic 101-Key Keyboard and Mouse
- Plug and Play enabled
- Energy Star Compliant
- PCMCIA **enabled**
- DOS, Windows and IBM Easy Tools
- The HelpWare 3-year warranty includes:
  - 1-year onsite service⁵
  - 30-day money-back guarantee⁴

WinWriter™ 200. The laser printer built specially for Windows.

- 300 x 300 dpi laser technology
- 4 pages per minute
- 22 fonts included
- 30-day money-back guarantee⁴

Only **$475.**

Call us, we're open 8am-10pm Monday-Friday and 9am-5pm Saturday (Eastern Standard Time) In Canada call 1 800 465-7999

IBM PC Direct

To order call today!

1 800 426·7255

enter source code 4932.

PLUG AND PLAY PRODUCT ROSTER

The Plug and Play–compliant products listed here are currently shipping or will ship in 1995.

Company	Product	Price	Shipping date
Ethernet Adapters			
Accton Technology Corp.	EtherCombo-16 EN1660 ISA adapter	$119.00	6/95*
	EtherPair-16 EN1661 ISA adapter	$109.00	6/95*
	EtherCoax-16 EN1662 ISA adapter	$109.00	6/95*
	EtherDuo-16 EN1668 ISA adapter	$109.00	6/95*
Cabletron Systems	Cabletron E2210 Ethernet adapter	$190.00	8/94
	Cabletron E2211 Ethernet adapter	$400.00	12/94
	Cabletron E2212 Ethernet adapter	$185.00	8/94
	Cabletron E2214 Ethernet adapter	$425.00	12/94
	Cabletron E2219 Ethernet adapter	$110.00	8/94
	Cabletron E221W	$449.00	8/94
Intel Corp.	EtherExpress PRO/10	$120.00	3/95
Standard Microsystems Corp.	EtherEz network interface card	$119.00	9/94
	EtherEz network interface card (coax version)	$124.00	9/94
	EtherEz network interface card (combo version)	$129.00	9/94
3Com Corp.	EtherLink III 16-bit ISA (coax)	$135.00	11/94
	EtherLink III 16-bit ISA TP	$132.00	11/94
	EtherLink III 16-bit TPO	$125.00	11/94
	EtherLink III 16-bit ISA Combo	$150.00	11/94
	EtherLink III 32-bit EISA (coax or twisted-pair)	$277.00	11/94
	EtherLink III 32-bit PCI TPO	$169.00	11/94
	EtherLink III 32-bit PCI Combo	$199.00	11/94
	EtherLink III 16/32-Bit Micro Channel (coax or twisted-pair)	$277.00	11/94
Token-Ring Adapters			
Andrew Corp.	Bridgeport/7512 Token-Ring bridge	$3,995.00	5/94
	Bridgeport/7806 Token-Ring bridge	$4,395.00	1/95
IBM Personal Computer Co.	IBM Auto16/4 Token-Ring ISA Adapter	$295.00	10/94
Intel Corp.	TokenExpress PRO	$295.00	10/94
Thomas-Conrad Corp.	TC4145-C Plug and Play Token Ring adapter	$299.00	9/94
SCSI Adapters			
Adaptec Inc.	Adaptec 1530P ISA SCSI adapter	$199.00	7/94
	Adaptec 1540CP ISA SCSI adapter	$249.00	6/95*
	Adaptec 1542CP ISA SCSI adapter	$269.00	6/95*
Future Domain Corp.	Plug and Play Valuepak (includes PNP-1630 adapter)	$149.00	12/94
QLogic Corp.	FastISCSI PCMCIA-10	$214.95	10/94
	FastISCSI IQ PCI (Fast/Wide SCSI-3)	$359.95	2/94
	FastISCSI IQ PCI-10	$249.95	11/94
	FastISCSI PCI Basic	$249.95	11/94
	FastISCSI PnP FL	$149.95	5/95*
	FastISCSI PnP Basic	$79.95	5/95*
Multimedia Peripherals			
ATI Technologies Inc.	Graphics Xpression	$249.00	7/94
	Graphics Pro Turbo (1600 version)	$599.00	3/95
Aztech Labs Inc.	Explorer external multimedia system	$299.00 to $389.00	8/94
Crystal Computer Corp.	Crystalizer Plug and Play MultiCD Sound Card	$249.95	2/95
	Crystalizer Plug and Play SCSI-2 Sound Card	$279.95	2/95
Tecmar Inc.	PC/TV external video-audio adapter	$455.00	1/94
Monitors			
NEC Technologies Inc.	NEC MultiSync XV14	$330.00	3/95
	NEC MultiSync XV15	$460.00	1/95
	NEC MultiSync XV17	$799.00	3/95
	NEC MultiSync XE15	$575.00	10/94
	NEC MultiSync XE17	$1,060.00	10/94
	NEC MultiSync XE21	$2,095.00	10/94
	NEC MultiSync XP15	$695.00	11/94
	NEC MultiSync XP17	$1,295.00	12/94
	NEC MultiSync XP21	$2,580.00	12/94
Portable Products			
IBM Personal Computer Co.	IBM ThinkPad Dock II	$719.00	6/94

* Predicted.

early PnP ISA cards that we tested: an Aztech Labs Explorer sound card and an Intel TokenExpress PRO network interface card. Because we did not have Windows 95 drivers for these cards at the time of this writing, we weren't actually able to use them from within Windows 95 except in a Windows 3.1 compatibility mode. Windows 95 will include device drivers for a variety of PnP ISA cards (just as printer drivers for popular printers are included in Windows 3.1), but you may still need to install drivers manually for some products.

Adding legacy ISA cards to a machine with a PnP BIOS. Upon bootup, Windows 95 was unable to detect automatically that legacy ISA devices had been added to the system. As a result, when we added legacy cards to the PnP-enabled Celebris 590 system, we had to initiate the configuration process ourselves by invoking the Add New Hardware wizard provided (with its own icon) in Windows 95. This wizard—similar in concept to the wizards in Microsoft applications such as Excel—walks you through the legacy card installation process and works with you to identify legacy ISA boards that cannot automatically identify themselves to the system (see the sidebar "Setting Up Your Hand-Me-Downs").

The Add New Hardware wizard can automatically identify many legacy ISA products by looking for identifying snippets of code or similar markers in the board's ROM or by interrogating I/O addresses for board-specific information. Determining what ISA cards are present is an arcane art at best, though, and Windows 95 was unable to recognize the specific boards we tried: an Aztech Sound Galaxy 16, a Creative Labs Video Blaster, an Intel TokenExpress ISA 16/4, a 3Com EtherLink 16, and a Trantor T160 SCSI. As a result, we had to bypass the auto-detection process and manually select the name of the adapter we installed from a list of close to 2,000 products. (All but one of the cards we tested—the Video Blaster—were in the provided database.)

Windows 95 knows the default settings for products in this database and will instruct you to reset the adapter's resource usage manually (DMA channel,

ARCHITECT. NAVIGATE. BUILD. DEBUG.
NEW SYMANTEC C++ 7.0 IS THE FASTEST WAY TO DO IT ALL.

Imagine roaring through the development process in a fraction of the time it takes with Microsoft Visual C++ or Borland C++. All you need is new Symantec C++ 7.0 with full support for Windows 95 Preview Program, Windows NT 3.5, Windows 3.1 and DOS.

THE FIRST TRULY OBJECT-ORIENTED C++ ENVIRONMENT.

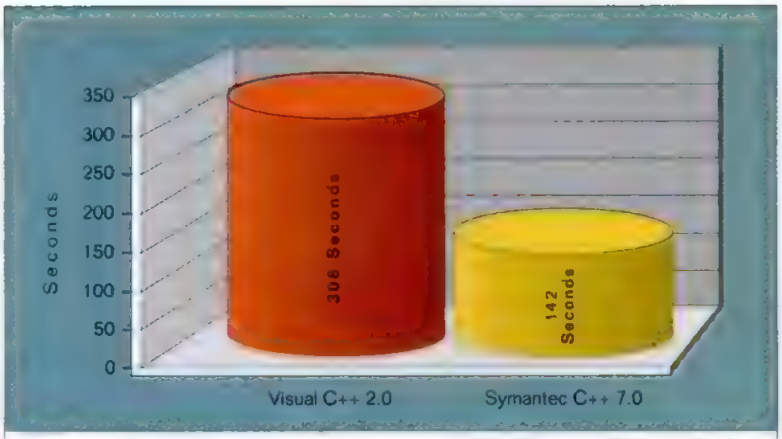
Symantec C++ 7.0 is the only C++ that lets you architect and navigate your application with a dynamic Class Editor and graphical Hierarchy Editor. This great new system incrementally parses your C and C++ code and displays an up-to-date structural model of your program without compiling. But that's only the beginning. It also lets you modify any class's inheritance graphically. Plus it automatically locates any class implementation, and much more!

THE NETBUILD REVOLUTION.

Now you can build applications faster than you've ever imagined. With the new NetBuild,™ you can automatically distribute the build process over multiple computers on your LAN, dramatically reducing build times.

In addition, AppExpress,™ ClassExpress,™ and ProjectExpress,™ give you Wizard-like functionality to boost your productivity.

And to make your link-cycle lightning-fast, there's new 32-bit OPTLINK® 6.0 – the world's fastest linker.



Average of 3 builds done on Pentium Processor using the debug version of MFC 3.0 with VC++ 2.0 makefiles. Borland excluded due to lack of support for MFC.

For building great Windows resources easily, we've added ResourceStudio – the new OLE 2.0-based resource editor that supports the widest range of Windows resources including Windows 95.

POWER DEBUGGING FOR WINDOWS 3.1 AND NT.

Symantec's Integrated Development and Debugging Environment (IDDE) provides the most powerful debugging features including Thread View, Inspector View, hardware watchpoints and low-level debugging.

CLASS EDITOR AND HIERARCHY EDITOR
dramatically increase your productivity.

NETBUILD
distributes the build process across networked resources for the fastest build times.

SUPPORT FOR WINDOWS 95
Preview as well as Windows NT 3.5, Windows 3.1 and DOS

APPEXPRESS, CLASSEXPRESS AND PROJECTEXPRESS
automate time-consuming tasks.

OPTLINK® 6.0
is the fastest linker in the world.

IDDE WITH 16 AND 32-BIT DEBUGGING
for Windows 95 beta, NT 3.5 & Windows 3.1

Of course, all of these productivity-boosting tools are integrated with a language that supports key standards like ANSI C++ (exception handling, templates and RTTI) and NT structured exception handling. And unlike Borland, Symantec supports MFC and includes it free.

In short, no other C++ lets you do it all this fast. Call the toll-free number below and see for yourself.

See how Symantec C++ 7.0 architects, navigates, builds and debugs faster than any other C++.
Call 1-800-628-4777 and ask for Extension 9166 now for more information and the name of the Symantec dealer nearest you.

SYMANTEC.®

For more information in Canada, call 1-800-667-8661, ext. 5513. In Australia, call 2-879-6577. In Europe, call 31-71-353111. Symantec, NetBuild and OPTLINK are trademarks and registered trademarks of Symantec Corporation. All other trademarks are the property of their respective holders. All rights reserved. Developers wishing to use Windows 95 Preview Program files must sign a beta agreement with restrictions for the use of those files. © 1995 Symantec Corporation.

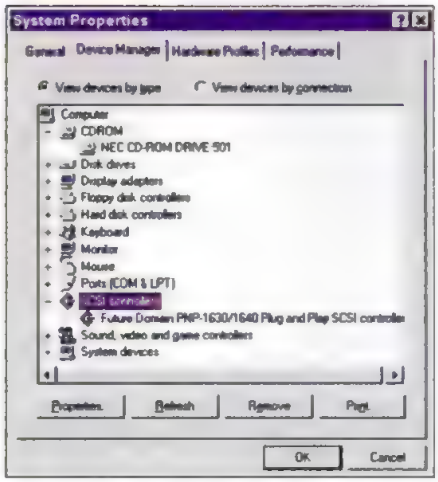
CIRCLE 186 ON READER SERVICE CARD

IRQ lines, and so forth) if the defaults would cause a conflict. Usually this means setting jumpers or DIP switches based on instructions in the board's documentation. In other words, Windows 95 does not provide explicit instructions on how to set the board properly; it just informs you what resources will work best and relies on you to figure out how to configure your hardware. This could obviously be a problem for the novice user. Hope that you haven't misplaced your instruction manuals.

Installing Windows 95 in a PC with a PnP BIOS. When we installed Windows 95 into an existing PC with legacy devices for the first time, it didn't make any overt attempt to identify the hardware inside. What this means is that sooner or later you'll need to tediously catalog all of the existing components in your system and the IRQs, DMAs, and memory addresses that they use—as we did—so that the operating system will know what resources are available for a new peripheral. But then, that's really no worse than what you typically need to do to install new hardware today, and once you're done, you should never have to repeat the process. If you don't take the time to tell Windows 95 about the installed hardware, adding PnP cards could easily cause a conflict: The operating system could assign resources to the PnP card that are not available simply because it doesn't know that they're in use.

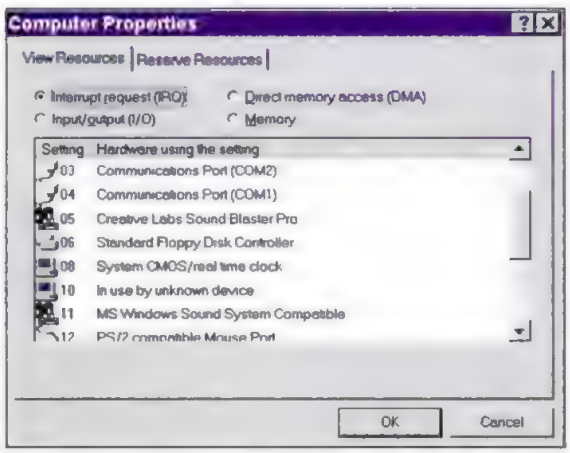
Adding PnP ISA cards to a machine without a PnP BIOS. Microsoft has taken great pains to ensure that Windows 95 can properly configure PnP cards even in machines that lack a PnP BIOS. This approach will be inherently less reliable than that in machines that do have a PnP BIOS because it means that Windows 95 has to try to identify various motherboard devices itself since the BIOS can't do it automatically. Still, we were able to make Windows' PnP work most of the time.

Using a Compaq Deskpro/M, which does not have a PnP BIOS, we installed the same PnP ISA boards as in the PnP-enabled Digital system. As before, configuration required no user intervention. For products with device drivers not included in Windows 95, you might need to install device drivers at this point.



Installing PnP devices couldn't have been easier. New devices automatically appeared on the Hardware Tree.

Adding legacy ISA cards to a machine without a PnP BIOS. Installing Windows 95 onto an existing, non–PnP-ready PC and configuring legacy ISA cards will entail many of the same difficulties that exist today. The Add New Hardware wizard in Windows 95 may alleviate some difficulties; it will at least do its best to suggest settings for the card that won't conflict with other legacy devices that are already installed and known to Windows 95.



Windows 95 lets you instantly see the IRQs, DMAs, I/O, and memory addresses of your installed devices.

BEYOND ISA

The PCI and PCMCIA buses were designed with Plug and Play–like capabilities in mind, so even existing cards should support automatic configuration and work within the Windows 95 PnP framework with the help of Windows 95 bus enumerators for PCI and PCMCIA devices. (An enumerator is a special software program that identifies devices attached to a bus.) Windows 95 then loads the appropriate device drivers. We tested this capability using an ATI Graphics Pro Turbo (1600 version) PCI graphics adapter in the Digital Celebris 590 and it worked, to a degree: The machine booted, albeit into a VGA-compatible mode, since we didn't have the Windows 95 device drivers to support higher resolutions and work with the board's special features.

When we tried a Proteon p1990 EISA network interface card in the Compaq Deskpro/M to test EISA's integration into the Plug and Play framework, configuration was slightly more complex but still manageable. We first had to identify the board using the ECU (EISA Configuration Utility, the tool EISA systems have always used to perform expansion card configuration). Then, when we reentered Windows 95, the built-in EISA enumerator was able to detect the updated information from the CMOS nonvolatile storage area and configure devices appropriately.

Microsoft says EISA support was still spotty in the beta version of Windows 95 that we tested, and that improved enumerators will ultimately mean that you won't need to use the ECU at all. Similar support is planned for Micro Channel devices, although it is uncertain whether the IBM-developed enumerator required for transparent Micro Channel configuration will be available when Windows 95 originally ships.

The VL-Bus 2.0 standard supports Plug and Play autoconfiguration, but in practice, this will be implemented rarely. By the time the VL-Bus 2.0 spec was ratified, PCI had become entrenched as the high-speed bus of choice. As a result, most VL-Bus cards comply with only the Version 1.0 specification and therefore operate like legacy ISA cards.

Plug and Play SCSI support is built into Windows 95 as well. If you're in the market to buy SCSI peripherals, look for

Most of today's client/server development tools force your applications to be driven by the outward appearance of things.

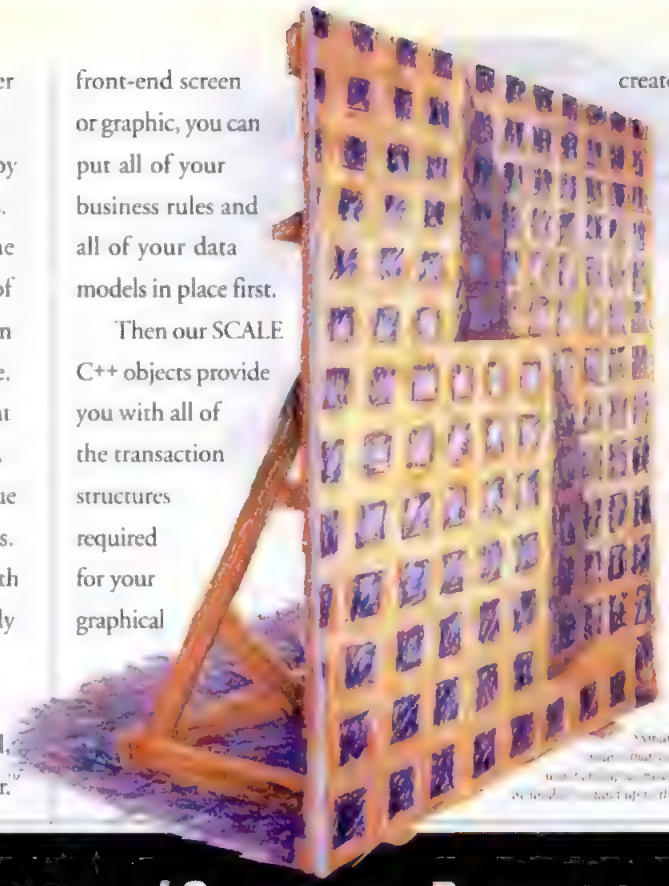
It's akin to putting in all the walls, windows and doorways of a building before the foundation and support beams are in place. You can build a small cottage that way, but certainly not a skyscraper.

The same principle holds true for client/server application tools. Especially if you are working with multiple databases and extremely large communities of users.

Which is why you should consider evaluating our powerful, 2.0 version of Enterprise Developer.™

front-end screen or graphic, you can put all of your business rules and all of your data models in place first.

Then our SCALE C++ objects provide you with all of the transaction structures required for your graphical



create with other C/S development tool sets. The bottom line is scalable, robust, enterprise-wide applications in record time.

So don't settle for a client/server development tool set that's just a facade.

Call and enroll in our

Is Your Client/Server Development Tool Just A Facade?

Enterprise Developer 2.0. For The Fastest Delivery Of Robust Enterprise-Wide Applications.

Unlike other client/server tools, Enterprise Developer 2.0 isolates the many complex components of client/server development in its own unique SCALE™ architecture.

The foundation of this new architecture is a business model repository that centralizes and stores your logical data models, the data locations, and all of your business rules separately from the presentation services.

So before you ever design a interface, delivering the complex logic that would take months to

Enterprise Developer 2.0.

SCALE Repository

Business Model: reverse/forward engineer logical data models from your databases. Store business rules for all of your client/server applications. View data models through interactive E-R Diagrammer.

Database Trigger Express: optimize performance by partitioning business rule logic between client and servers through generation of database triggers.

SCALE C++ Objects

Leverage the information in the business model to derive the master detail processing, business rule enforcement, multi-user access, transaction integrity and data caching behavior for each application.

Visual Environment

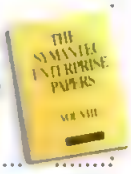
RAD is fostered through our active business model repository and a high level of default processing, shrinking development from months to weeks.

Enterprise Developer Evaluation Program where you can examine the structural superiority of our new Enterprise Developer for yourself.

Then get ready to develop robust, client/server applications that have the structural integrity to really scale across the enterprise.

Call 1-800-488-9914.

Ask for Ext. 9165 and request Enterprise Developer Evaluation Program information. (U.S. only). In Canada, call 1-800-667-8661 extension 5818. In Australia, call 2-878-9655.



SYMANTEC.

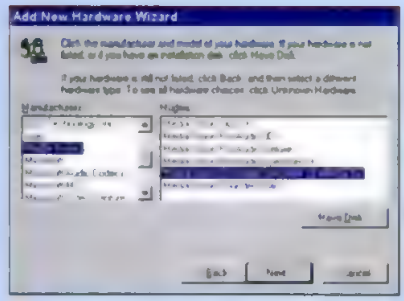
MANAGING THE ENTERPRISE.

CIRCLE 911 ON READER SERVICE CARD

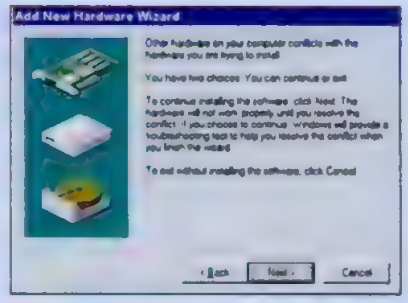
Setting Up Your Hand-Me Downs

In an ideal world, you would buy a Windows 95–equipped Plug and Play system as well as all new hardware and never worry about configuration problems again. But most of us won't be throwing out our old sound cards, CD-ROM drives, and NICs to buy PnP-ready devices if we upgrade to Windows 95.

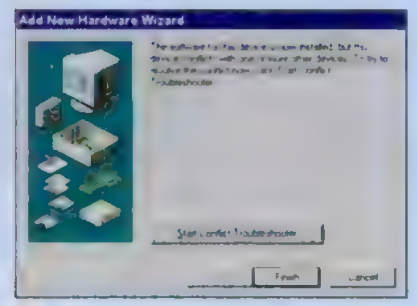
The process you go through to install a legacy device will vary depending on whether or not the OS is able to recognize the device automatically and whether there are resource conflicts. In this scenario we installed a Media Vision Pro Audio Spectrum 16 sound card (with a SCSI connector) that was not detected automatically and did conflict with another device.



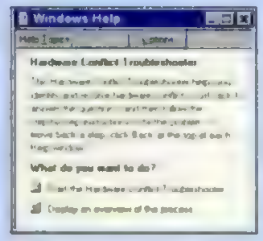
1 Initially, we launched the Add New Hardware Wizard and asked it to detect the ISA sound card we had installed. Unable to find it, the wizard prompts us to choose the Install Specific Hardware option. In this screen we have selected our card from handy pick lists (almost 2,000 cards are listed in the database).



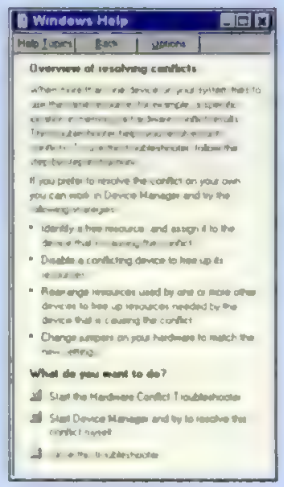
2 Knowing the default settings for the Media Vision card from its database entry and aware of the settings of other cards in our system, the wizard alerts us to an unspecified conflict. We choose to continue.



3 The wizard downloads the Media Vision device drivers from the OS's database and then gives us the option of running the Conflict Troubleshooter.



4 A series of dialog boxes, such as this one and the next, hold our hand through the troubleshooting process.



5 The overview nicely explains the options you have at this point, including instructions should you decide to tackle the conflict resolution on your own. We start the Conflict Troubleshooter.

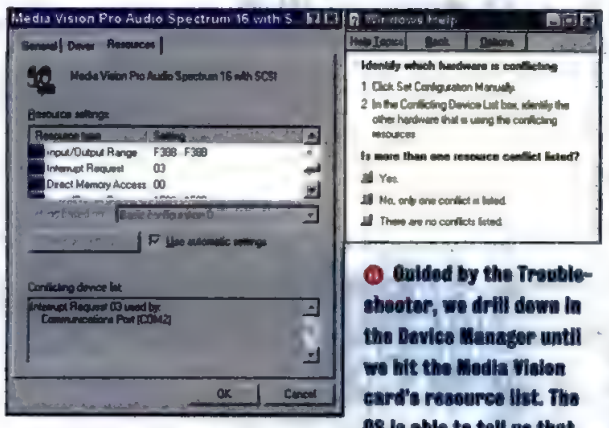
devices that comply with a specification called SCAM, which stands for SCSI Configuration Automatically. SCAM not only allows SCSI devices to be recognized by a PnP operating system, it provides automatic termination of the SCSI bus and remapping of SCSI device IDs, which should eliminate many of the traditional difficulties associated with SCSI configuration.

A draft standard for PnP monitors extends the VESA DDC (Display Data Channel) standard; this lets monitors communicate the resolutions and refresh rates they support to graphics cards, the OS, graphics drivers, and configuration utilities. These can then take actions such as blocking out unsupported modes or automatically setting themselves to exploit the monitor's highest refresh rate at a particular resolution. DDC-compliant monitors are just beginning to appear, but we expect the feature to become standard in monitors introduced in the second half of 1995.

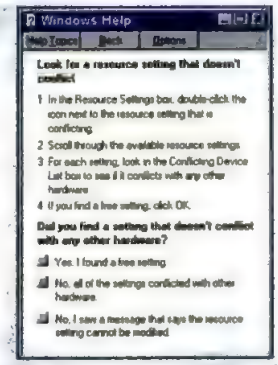
Additional specs cover PnP parallel and serial port devices as well. Here, the underlying idea is to enable the PC to automatically identify connected devices and install the appropriate device drivers. In theory, this would make connecting a printer or modem a simple matter of plugging the cable into the back of the machine: You wouldn't have to know what model it is or what capabilities it offers.

UNDER THE HOOD

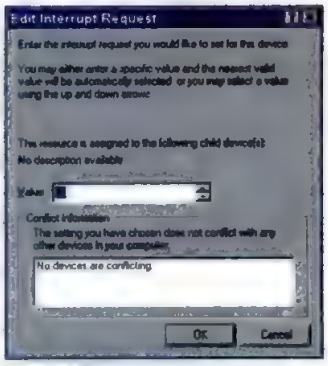
How do the BIOS, operating system, and hardware devices interact to work their autoconfiguration magic? In a fully PnP-



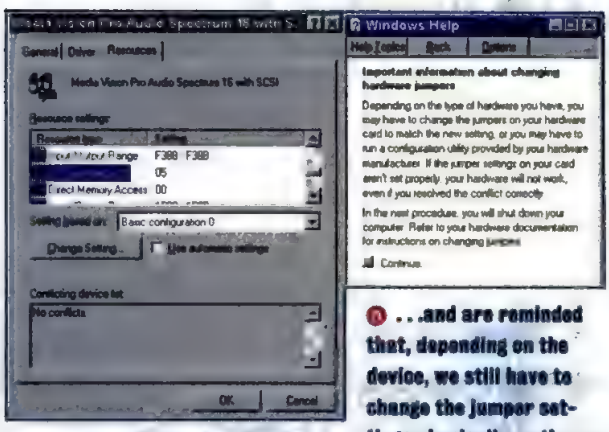
❶ Guided by the Troubleshooter, we drill down in the Device Manager until we hit the Media Vision card's resource list. The OS is able to tell us that the conflict is with IRQ 03, which is taken by the device on COM2.



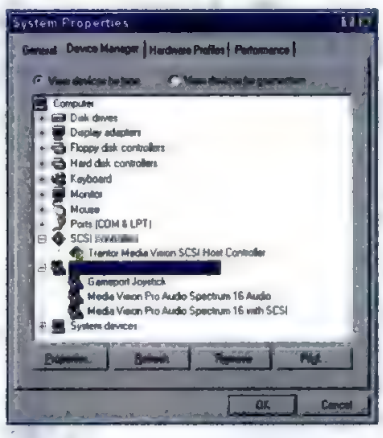
❷ The Troubleshooter then sends us to the Resource Settings box to find an open IRQ.



❸ We change the setting in Windows 95 software to IRQ 05. . .



❹ . . .and are reminded that, depending on the device, we still have to change the jumper settings physically on the card itself. I hope we kept the manual.



❺ After restarting our computer, we check the Device Manager to see our new card. The Media Vision card is now included—but what's that yellow flag on our SCSI controller? The Trantor SCSI controller on the sound board conflicts with another device in our system. adapter. Here we go again. . . .

enabled machine, the PnP BIOS enables all PnP cards, then puts them to sleep, waking each one individually to assign a unique card-select number (CSN). The BIOS then queries each PnP device by its CSN and compiles a list of PnP cards and their required resources.

Some BIOSes then disable all PnP devices except those needed to boot the system (keyboard, hard disk, graphics adapter); others configure and enable all PnP cards at this time. There are advantages and disadvantages to both scenarios. Enabling all the PnP cards up front is the only way to make them work if the operating system does not contain PnP support; keeping some PnP cards dormant until the OS loads reduces the likelihood of a conflict with a legacy device (which the PnP OS might know about even if the BIOS doesn't). Intel is encouraging BIOS manufacturers to support both approaches through a user-accessible CMOS setting.

If the BIOS is set to enable only boot devices, it will try to set them up in a way that avoids conflicts and allows the operating system to enable remaining PnP devices. Even this process could fail if a misconfigured legacy card is installed in the system, however. When it loads, the operating system must also invoke device drivers for all the devices in the system.

The operating system's PnP functionality is coordinated by the Configuration Manager (CM). The CM controls the operating system components that actually interact with the hardware, including enumerators for each expansion bus in

SIGHT AND

Experience the ultimate in multimedia . . . the **ViewSonic 15GA** and **17GA PerfectSound™** multimedia monitors. Be prepared for a blast of sight and sound that engulfs you with rich, lifelike tones, directed towards YOU. Plus, since you don't need separate speakers, you'll save valuable desk space.

The explosion from ViewSonic's mutimedia monitors will revolutionize the industry . . . especially business, entertainment and teleconferencing applications. With the latest dome speaker technology and microhole speaker grills integrated into the monitor bezel you'll hear full high fidelity stereo sound. We thought of everything — even a built-in microphone, headphone jack and external microphone port. And, when the phone rings, you can mute the sound with the touch of a button.

In addition to the terrific sound, these new 15" and 17" CRTs (14.0" and 16.0" diagonal viewable areas respectively) both feature a Super Contrast screen, 0.27mm dot pitch, resolutions up to 1,280 x 1,024 and an ultra high refresh rate of 86Hz at 1,024 x 768. You'll be proud of the beautiful, brilliant, photo-quality screen images. Our OnView™ controls allow you to make image ***and*** audio adjustments right on the screen. Plus these monitors are *Plug & Play* +* for Windows'95, which automatically provide the utmost in screen image capabilities.

In keeping with today's concerns for radiation, safety and the environment, these monitors not only exceed MPRII and EPA Energy Star requirements, but have also adopted the most stringent Swedish TCO standards for reduction of heat emissions and exposure to electromagnetic fields.

ViewSonic multimedia monitors . . . a sound investment.

COMDEX BOOTH M4922

colorific

KODAK

ViewSonic®

See The Difference!™
and Hear

Tel: (800) 888-8583 Ext. #245 or (909) 869-7976
Fax: (909) 869-7958
Call FaxSonic at (909) 869-7318 (fax-on-demand)
Request Doc 143 (15GA), 150 (17GA)
Applelink: VIEWSONIC Compuserve: 73374, 514

*Requires a IBM compatible video card
All products and trademarks are brand names of their respective companies
Specifications subject to change without notice

CIRCLE 118 ON READER SERVICE CARD

SOUND
EXPLOSION
PerfectSound™
Multimedia Monitor
ViewSonic 17GA
decresc.
decresc.

the system. Information that the CM and supporting software gather about devices in the system is collected in a structure called the Hardware Tree. A visual representation of the Hardware Tree is available on the Device Manager dialog page, accessed through the System icon on the Windows 95 Control Panel. By clicking on individual devices in the tree, you can see their resource allocations and driver information.

CERTIFICATION

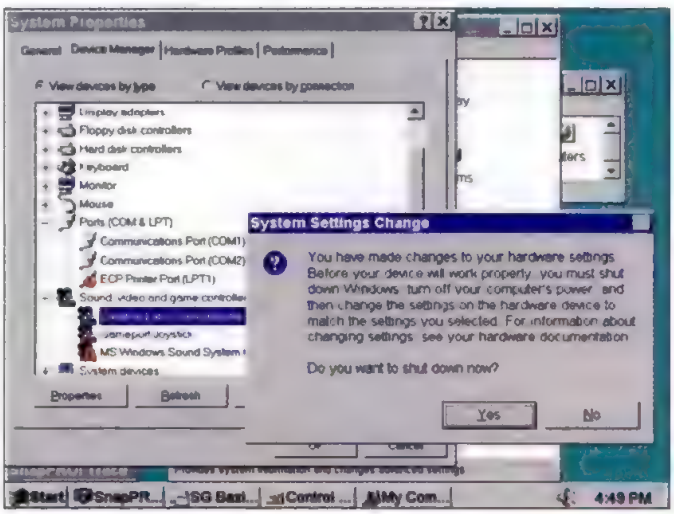
With an ambitious set of standards like those proposed for PnP, there's a risk that different vendors will interpret them in subtly different ways that lead to incompatibilities. Even barring this possibility, it will be many months, if not years, before systems are entirely PnP-enabled. The potential for confusion in the interim is enormous.

Microsoft plans to make buyers' decisions easier by undertaking an aggressive compatibility certification program. Machines that pass the tests will be eligible for a Windows 95 logo.

For systems, the logo means that the machine includes a PnP BIOS, plus additional system-specific PnP support. For instance, notebooks with docking station options need to support hot docking. And Microsoft also recommends (but doesn't require) that desktops include PnP-compatible devices—from IDE hard disks to ISA cards. The Windows 95 logo will also indicate that the machine's components meet Microsoft's minimum "PC 95" hardware specifications for running Windows 95: a 386-based or better CPU, 4MB RAM, a 640-by-480 display supporting 256 colors via a flat-frame buffer, a dedicated mouse port or integrated pointing device, one serial port, and one parallel port.

LOOKING AHEAD

One of the most exciting aspects of Plug and Play is its support for dynamic reconfiguration events, which helps lay a foundation for "anywhere, anytime" computing. PCMCIA hot swapping is nothing new, but the Plug and Play frameworks hint at a far more robust communication model that would actually let applications make intelligent responses to configuration events. Your word processor might ask whether you want to save your file before ejecting a notebook from a docking station with a hard disk. Or, as you walk into your office, your notebook could transparently connect to the network and begin downloading your e-mail. Also covered under the dynamic reconfiguration umbrella: Basic notebook hot-docking capabilities, such as informing the PC about the availability of additional serial and parallel ports, mass-storage devices, and a higher-resolution display.



The screen message above shows that with legacy cards, you still have to do some things the old-fashioned way.

Dynamic reconfiguration events will require support not just in the OS but also in applications. Windows 95 and the PnP frameworks define a strategy for providing these capabilities, but it will be at least a year before software really implements them effectively.

THE PROGNOSIS

Our initial impressions of Plug and Play are relatively favorable. Although the standards are bound to experience growing pains, Microsoft's PC 95 certification program should help steer vendors in the right direction. And even if some of the proposed aspects of the PnP frameworks don't fall into place immediately, many of Plug and Play's benefits will be tangible as soon as PnP-compatible ISA cards begin shipping.

For owners of older machines, PnP may reduce configuration hassles, although legacy card configuration problems will persist. And there are a few other limitations that PnP simply cannot eliminate. For instance, it's possible that two legacy ISA cards will support such a limited selection of resources that they simply cannot be used in the same machine without conflicts. (To avoid this difficulty with new products, Microsoft strongly recommends that PnP devices be built to support eight IRQ lines, three DMA channels, eight base I/O address locations, and eight base memory address locations.)

PnP also doesn't remove a fundamental barrier built into the PC architecture, namely the finite number of IRQs (15) and DMA channels (7) that exist. Many of these are allocated for hardwired system devices such as timers and various controllers; in fact, a point of contention among PnP's backers is how to handle some interrupts that are often assigned to devices, such as printer ports, that don't actively use the IRQs. That means that if you add enough cards, sooner or later you'll still run out of options.

Some misbehaved applications that write directly to hardware may also prove incompatible with PnP's potential to remap key resources. With PnP OSes and PnP devices still in preproduction stages, it's too early to tell whether this will be a significant problem or not. The most likely culprits are games, which are notorious for breaking every hardware-interface convention in the interest of performance.

These limitations are insignificant given PnP's promise. While reaching its utopian goals will take time—probably a matter of years rather than months—Microsoft and its collaborators are laying the foundation for a fundamental improvement in the usability of the PC.

You can find more PnP information, including standards documents, in the Plug and Play Forum on CompuServe (GO PLUGPLAY). □

COMMUNICATING WITH WINDOWS 95

Hooked and Linked

The best network client, strong remote access, and a capable peer-to-peer LAN, Windows 95 makes communicating a breeze.

By Steve Rigney

IN THIS SECTION

Built to Connect 176
Laptop Links 178
Dawn of the Universal Client? 188

What does Microsoft Windows 95 mean to network users and administrators? In a nutshell: a customizable, universal network client. You'll have to do some work up front, but after installation you can bend and shape Windows 95 to fit into any network configuration.

We spent weeks comparing the network features of Windows 95 and OS/2 Warp, Windows 3.1, Windows for Workgroups 3.11, and Windows NT Workstation. We connected clients running these operating systems to servers running NetWare 3.12 and 4.1, IBM OS/2 LAN Server Advanced 4.0, and Windows NT Server 3.5.

We found that in terms of flexibility and functionality, Windows 95 is the best network client for all these network operating systems. All features are easy for administrators to install and manage. The networking benefits of Windows 95 include:

• The best NetWare integration in its class.

Illustration by Jaime Beauchamp

- The utilities you need to connect to almost any other existing network.
- Good peer-to-peer networking that allows you to set up a small workgroup LAN by adding network cards and cabling.
- Multiple dial-in options. There's client software for Windows NT's Remote Access Server, Windows 95's own limited dial-in server, Novell's NetWare Connect, and Shiva's LanRover or NetModem.
- Easy-to-use laptop synchronization by parallel or serial cable. Also, laptops hooked to a desktop have access to all the same drives, printers, and other resources as the desktop PC (see the sidebar "Laptop Links").

Windows 95 has even more features than its big brother, Windows NT, and far more than its predecessor, Windows for Workgroups. In comparison, the current version of IBM's OS/2 Warp lacks robust networking functionality (other than stellar Internet access), although that should change with the imminent arrival of the next version, Warp Connect, which is expected to offer peer-to-peer functionality, remote access, and a range of protocols. (See "OS/2 Warp and Beyond" in the main introduction to this cover story.)

We also found that the four clients differed in their included networked applications. Where Windows for Workgroups and Windows NT both have Microsoft Mail and Schedule Plus, Windows 95 provides a new set of programs collectively known as Microsoft Exchange. With Exchange you finally have a single mailbox that offers mail, fax, and data, as well as connections with some third-party services. The current beta version of Windows 95 ships with drivers for Microsoft Mail, CompuServe mail (but not CompuServe forums), Internet mail, and Microsoft Network, but not MCI Mail. Exchange will work with existing Windows for Workgroups and Windows NT post offices (see the sidebar "Dawn of the Universal Client?"). In comparison, OS/2 Warp includes the Internet Access Kit, Web Browser, and Internet Mail, and Warp Connect will add Lotus Notes Express and other drivers.

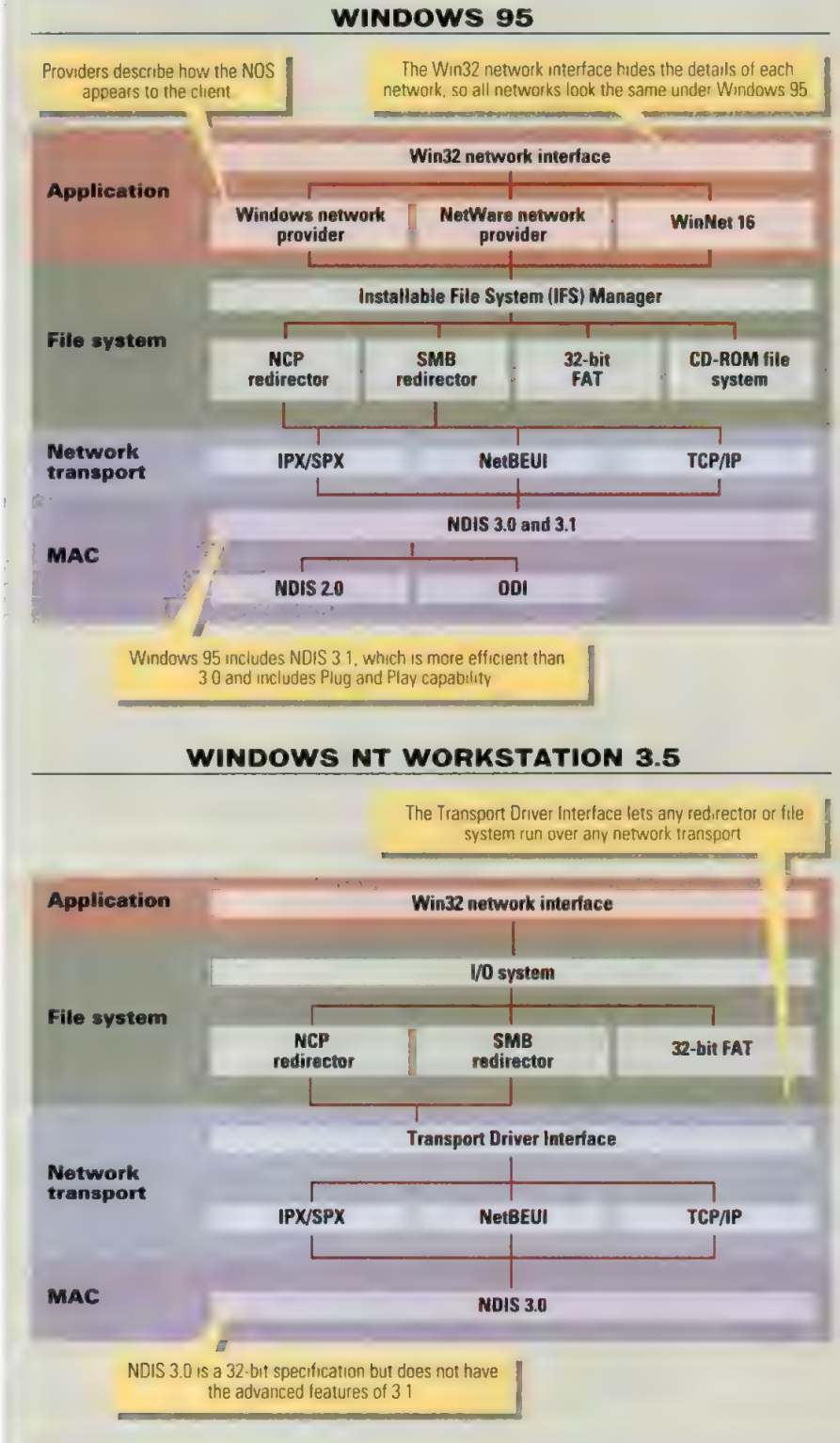
WHAT YOU'LL SEE

In-the-office users can take advantage of the built-in networking and communications functionality with four utilities: Net-

BUILT TO CONNECT *The networking facilities in these*

The **application** level comprises the operating system's client-side programming interfaces

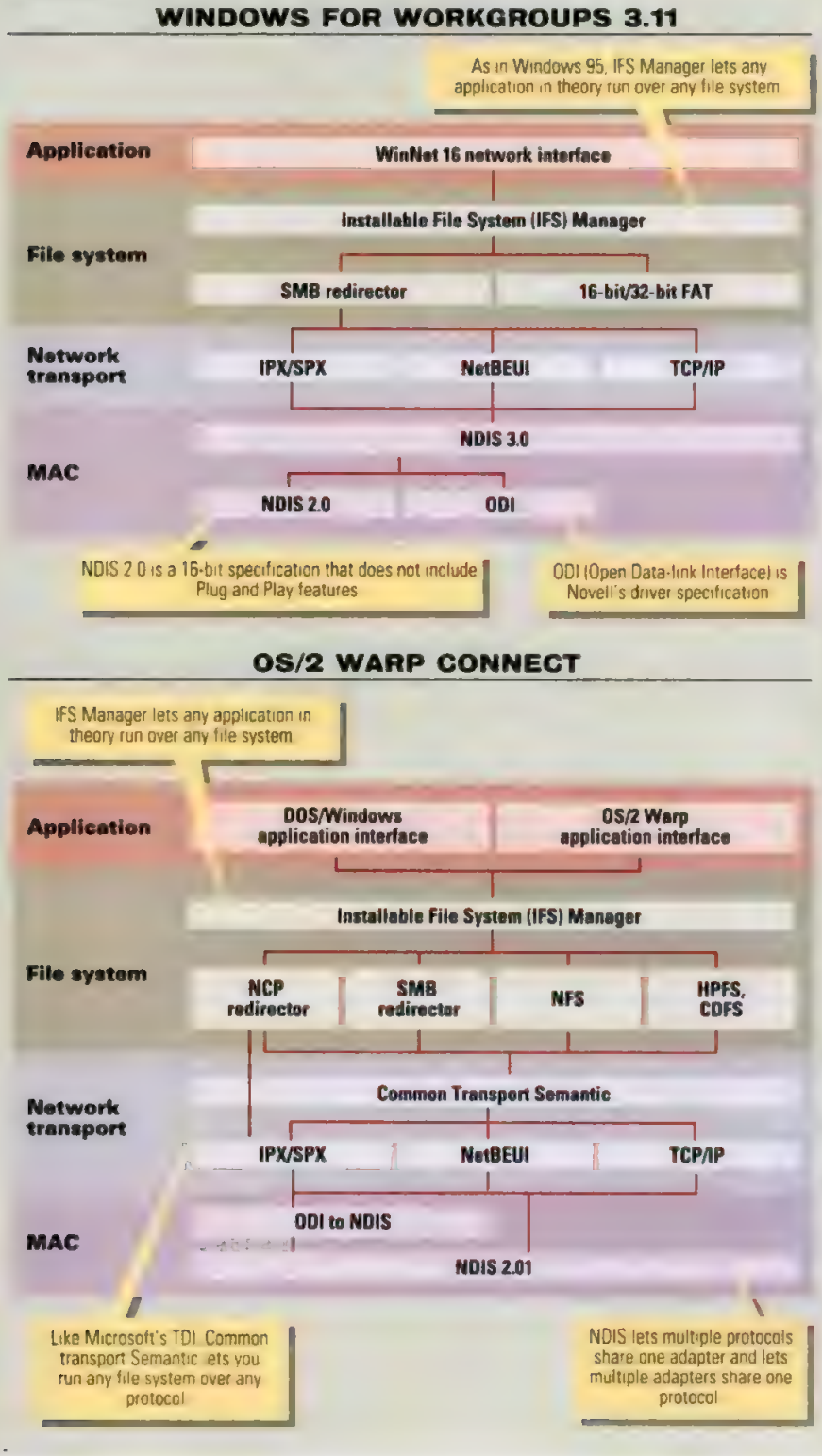
Components in the **file system** level handle the file operations (opening, deleting, writing) initiated by the application.



operating systems fall into four categories.

The **network transport** level consists of protocols that carry these operations across the network.

The software in the **MAC (Media Access Control)** level determines whether these operations can be sent across the network.



work Neighborhood, Windows Explorer, Control Panel, and Briefcase.

Network Neighborhood makes connecting to and disconnecting from network resources far easier than in Windows for Workgroups or Windows NT. But it's not as intuitive as with other peer-to-peer LANs such as LANtastic or PowerLAN. Warp Connect promises this functionality.

Network Neighborhood presents a list of available servers. You can select, map a drive, or attach to the server. If you have logged onto the server, you can also browse resources such as file and queue names. While you can open a file or run an application, you cannot perform other file operations such as copy, delete, move, or rename. For that you'll need Windows Explorer, Microsoft's juiced-up version of File Manager. As with Program Manager and File Manager in the current Windows, the relationship between Network Neighborhood and Explorer is muddled, and for many jobs you'll need both of them.

You configure the client through the Control Panel, as you do currently. But Microsoft has greatly expanded Control Panel's functionality. You can define the PC as a server or client and set the user name and password, security information, network type, and kinds of network protocols used.

For road warriors, there's Briefcase. It allows you to copy files from the network or desktop to a portable or floppy disk and have Windows 95 handle the file copying, disk compression, and disk management of moving files. But for PC-to-portable transfers, you'll have to provide your own parallel or serial cable.

Also, when desktop and laptop are linked, you can take advantage of all the functionality of your desktop PC: You can print to a local or network printer, access a CD-ROM drive, or use the local PC or file server as a backup device. Windows 95 even lets you set up your desktop PC as

Our Contributors: STEVE RIGNEY is a networking consultant and a contributing editor to *PC Magazine*. TONY POMPILI is a networking and workgroup consultant and a frequent contributor to *PC Magazine*. DAVID GREENFIELD was the senior editor in charge of this story.

a dial-up server, so you can access it (with the appropriate passwords) from afar with your portable.

HOW IT NETWORKS

As you dig deeper into Windows 95, you find a tremendous software infrastructure. There are network drivers for linking your PC to the LAN, network protocols for speaking the right language once you're connected, and network redirectors that let you log into NetWare and Windows NT servers. All these components use 32-bit code, which means they are very fast.

Windows 95 follows the Microsoft networking structure established in Windows NT and Windows for Workgroups. In the default configuration, the Server Message Block formulates and answers requests for services while NetBEUI packets carry the requests across the LAN. But Windows 95, like Windows NT, can alternatively use Microsoft's version of Novell's Internetwork Packet Exchange (IPX) to carry the LAN traffic. The package also includes TCP/IP LAN protocols and utilities that are particularly useful for Internet connections.

The 32-bit protected-mode versions of TCP/IP, NetBEUI, and IPX/SPX bundled in Windows 95 are faster and use less memory than Windows for Workgroups' 16-bit drivers. Best of all, because the drivers run in protected mode, the client software won't freeze if the node is disconnected from the LAN, as it

Laptop Links

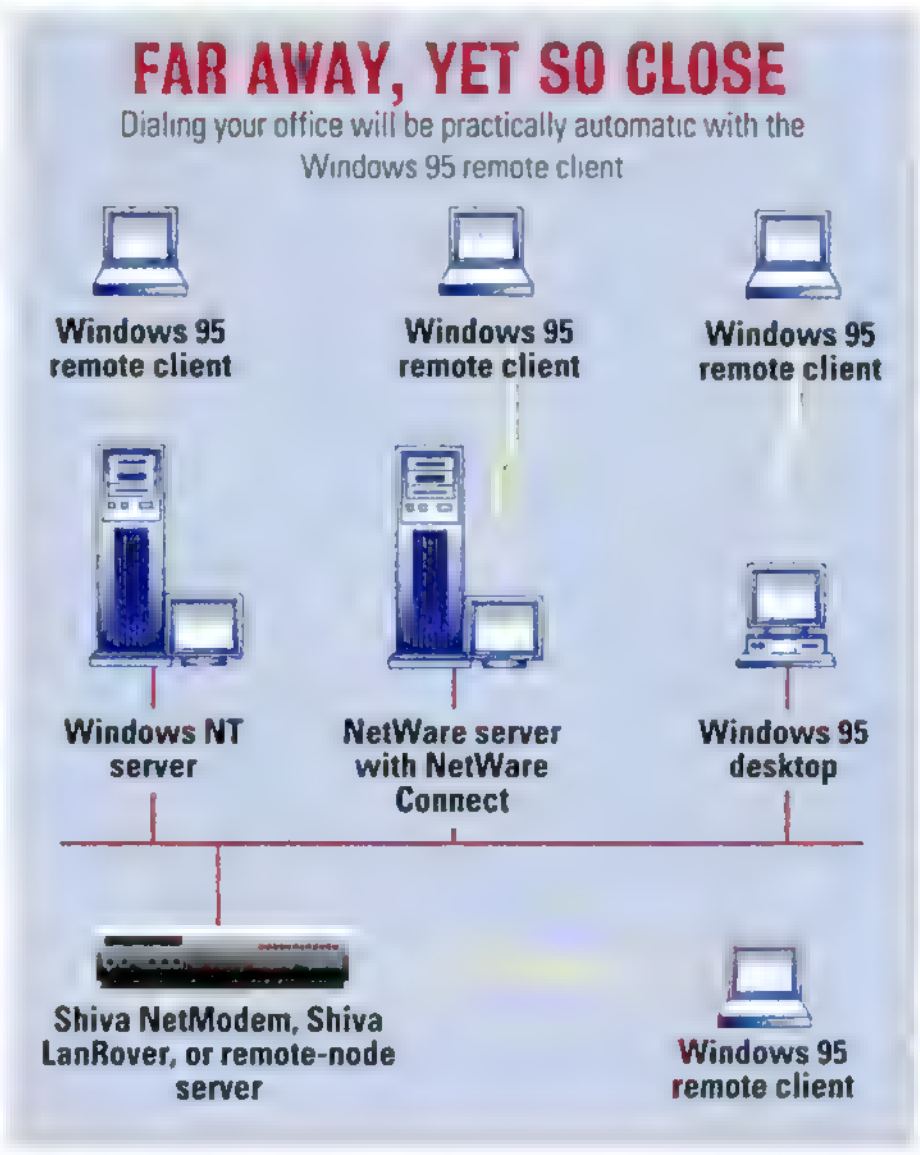
By Steve Rigney

When Microsoft's engineers designed the networking features of Windows 95, they didn't forget the mobile PC users of the world. With remote access and Plug and Play, Windows 95 lets you easily connect to a Windows NT or NetWare network whether you're in the office or away.

Windows 95's remote-access services are probably its most exciting features for mobile PC users. With a laptop and modem, you can reach back to your LAN by calling directly into a Windows 95 machine or by using a remote-node server to connect as a node on the LAN. Windows 95 includes drivers for Windows NT's Remote Access Server (RAS), Novell's NetWare Connect, and Shiva's LanRover and NetModem remote-node servers. You can also use any Windows- or DOS-based third-party remote-access client to connect to your Windows NT or NetWare network (for more information, see "Extend Your Reach," August 1994).

While IBM's OS/2 Warp, Version 3, does not have any built-in remote access, Warp Connect—expected to ship this quarter—will include a LAN Distance remote-access client among other networking features (see "OS/2 Warp and Beyond" in the main introduction to the cover story).

We tested remote-access capabilities using several different servers, including Windows 95, Windows NT, and a Shiva NetModem. All the clients worked as advertised, but you will need a few hours to set up the server and client software. Also, each client you install can require as much as 2MB of additional disk space—a limited resource on most notebook PCs.



If you don't want to invest in a remote-access server like NetWare Connect, you can configure a standalone Windows 95 PC as a dial-up server. Unlike Windows NT's RAS server, the Windows 95 dial-up server has no IP routing, and you're limited to one connection at a time. Once connected to the Windows 95 dial-up PC, you can use the System Policy editor for network maintenance, and send and receive Microsoft Exchange e-mail (see the sidebar "Dawn of the Universal Client?").

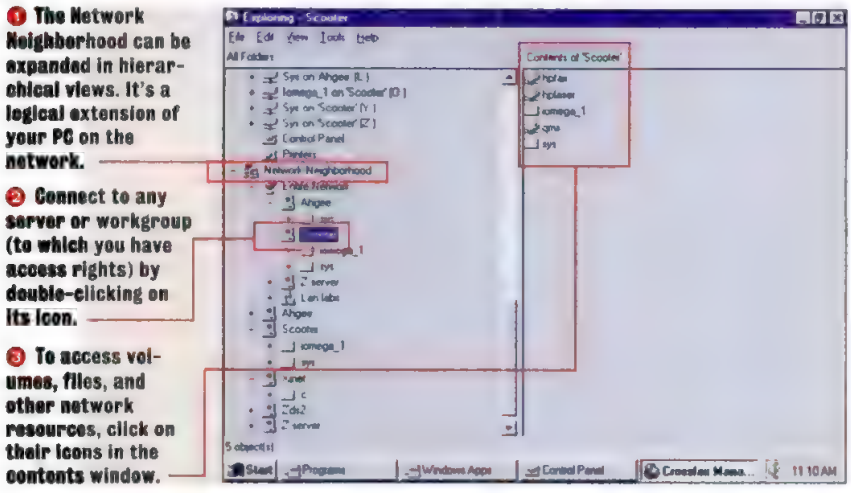
You connect to a Windows NT RAS server with the same client software you use to dial up a Windows 95 server. But using Windows NT as your access server offers more power and flexibility, with up to 256 concurrent connections, simultaneous IP and IPX routing, and the ability to use high-speed X.25 and ISDN links.

Windows 95's Plug and Play capabilities also will make linking your PC into the network easier than ever. (See "Windows 95 Plug and Play: Effortless Upgrades" in this issue.) You won't have to guess at modem setup strings or try to find the right NDIS interface software.

Like IBM's OS/2 Warp, Windows 95 includes Card and Socket Service drivers for PC Cards (the new name for PCMCIA cards). The built-in card and socket services allow Windows 95 to determine what type of PC Card you have in your notebook and let you add and remove adapters without turning off your notebook or rebooting. Windows 95 can also determine when you are disconnected from the network and automatically unload the network drivers to make the extra memory available. □

The Network Neighborhood

You can use the Explorer in Windows 95 to view the Network Neighborhood, which lists all of the available servers, domains, and workgroups on your network and their contents.



does with Windows for Workgroups. You can use third-party drivers for different networks, but these typically will run in real mode and so will be slower and more fragile.

PCs running Windows 95 can share disk drives and attached printers with NetWare, Windows NT, or Windows for Workgroups clients without changing any software in the clients. A utility called NetWare File and Print Services responds to requests from NetWare clients, and Windows Network File and Print Services does the same for Windows network clients. Unfortunately, you can't install both Windows' and NetWare's file and print service on the same Windows 95 PC. Network administrators should note that sharing is not a default, and you can elect not to install the server capabilities.

HOW WELL IT NETWORKS

Does all this connectivity stuff work as Microsoft claims? For the most part, yes. We were able to connect easily to our respective servers when running the appropriate protocol—IPX/SPX for NetWare, NetBEUI for LAN Server, or any of the protocols for NT Server. We were also able to use the built-in TCP/IP stack for accessing the Internet. But implementation differences prevented us from logging into a NetWare server using the TCP/IP software. Microsoft claims that Novell implements the IP stack differently.

Windows NT and Windows 95 IPX protocols worked fine, and we could connect to both NetWare and Windows NT file servers. Windows NT and Windows 95 both also provide a built-in driver for LAN Manager networks, but to use any LAN Manager utilities you will have to use the optional real-mode driver. OS/2 Warp does not provide client interfaces for network operating systems, but expect to see them later with Warp Connect.

The Windows 95 NetWare client software also executes your NetWare login script and—like the other operating systems—allows you to use all the NetWare utilities, such as NetAdmin, Syscon, Pconsole, and Fconsole. Only Windows 95, however, has a built-in utility to execute your login script. Unfortunately, Windows 95 cannot load any TSRs that may be in your login script. You'll have to launch them from your AUTOEXEC.BAT or another batch file.

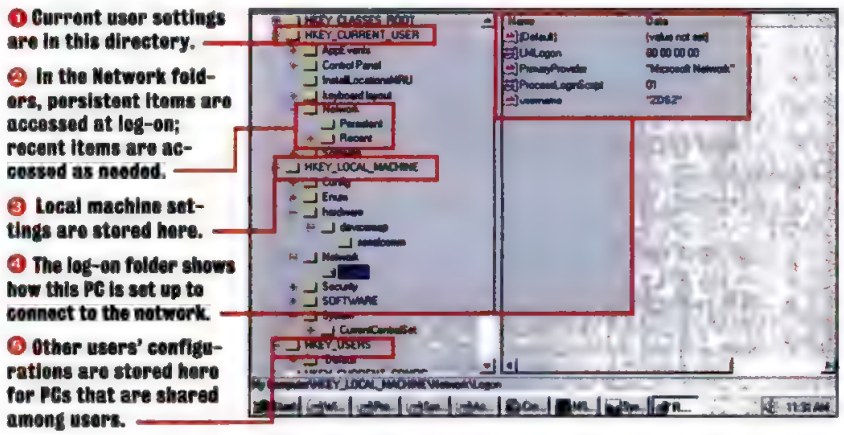
Third-party drivers are also available for Windows 95, but these will typically run in conventional memory and thus be slower. Also, there's no guarantee third-party drivers will comply with NDIS, Microsoft's Network Driver Interface Specification, which defines how network drivers should be written and allows multiple protocol stacks to share one adapter. NDIS now uses a new architecture for smaller drivers. These drivers can also now automatically detect and configure an adapter through NDIS's inclusion of card and socket services.

SECURITY: TWO LEVELS

Peer-to-peer networks let you quickly share resources such as CD-ROM drives and printers, but you don't want everyone connecting to your PC and playing with your important data. Windows 95 provides two levels of security: share-level and user-level. The *share-level* security is similar to the security found in Windows for Workgroups: If you want to protect a

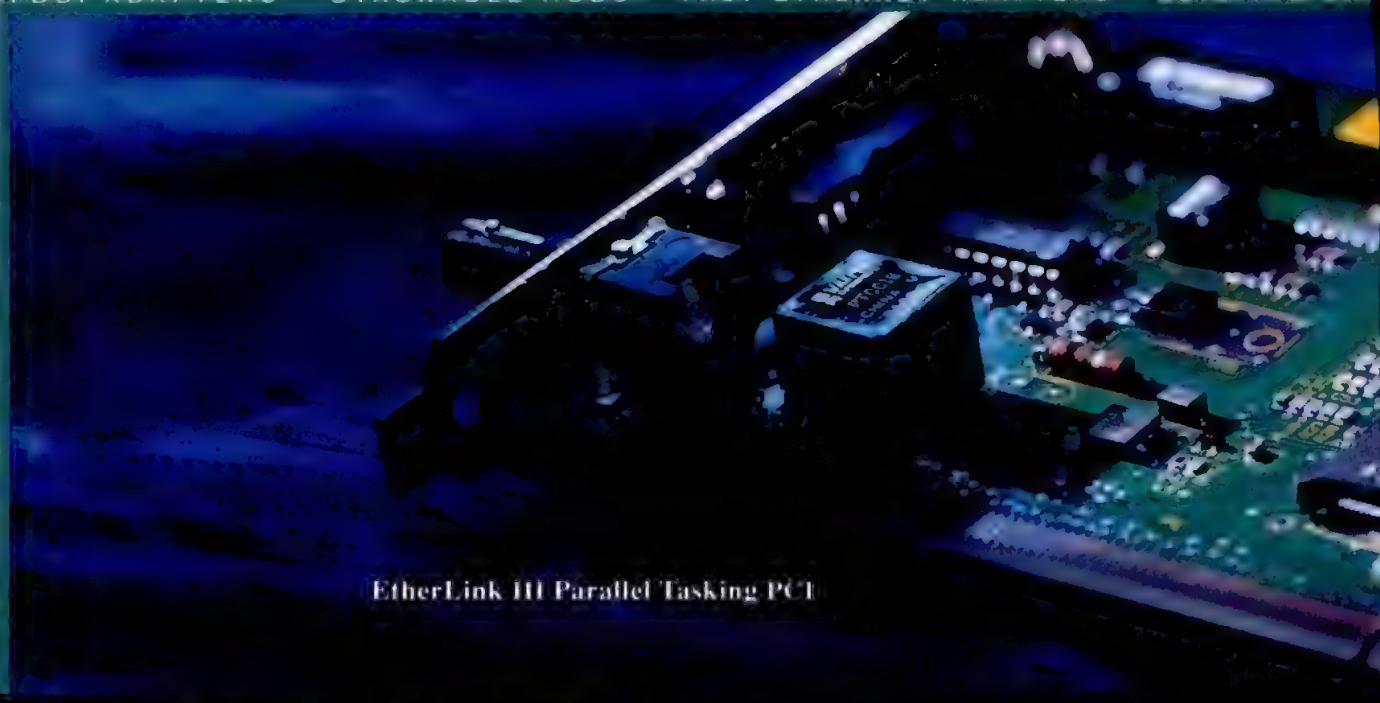
The Registry: See a Low-Level View

The Registry in Windows 95 stores configuration information, including users' network settings. The users can modify settings in this utility, but it is safer—and easier—to make system changes using another utility, such as the Control Panel.



FDDI ADAPTERS STACKABLE HUBS FAST ETHERNET ADAPTERS BUILDING/CA

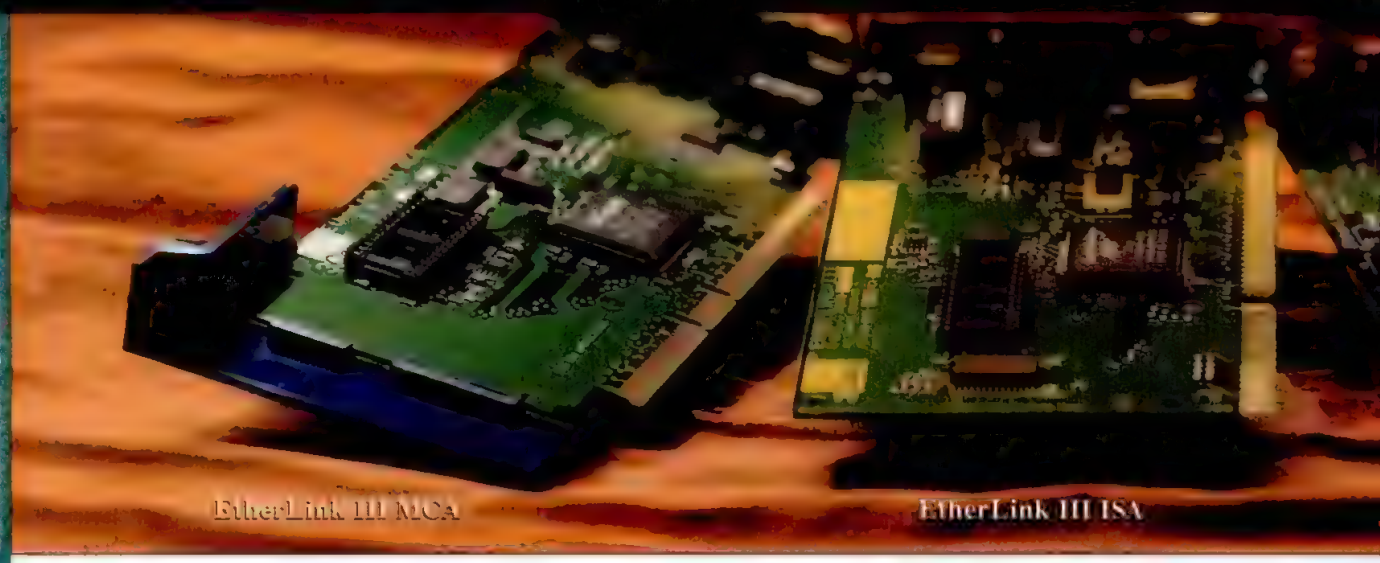
S PC CARD ADAPTERS SWITCHING HUBS



EtherLink III Parallel Tasking PCI

Introducing the hottest adapter to

REMOTE ACCESS SERVERS WORKGROUP SOLUTIONS STACKABL



EtherLink III MCA

EtherLink III ISA

You might say we're on a roll. Presenting 3Com's EtherLink® III PCI adapter, the newest addition to our long line of powerful adapters for the industry's hottest new bus type. And the best performing Ethernet PCI adapter available. All at a price that makes it an extraordinary value.

The EtherLink III PCI Adapter Card.

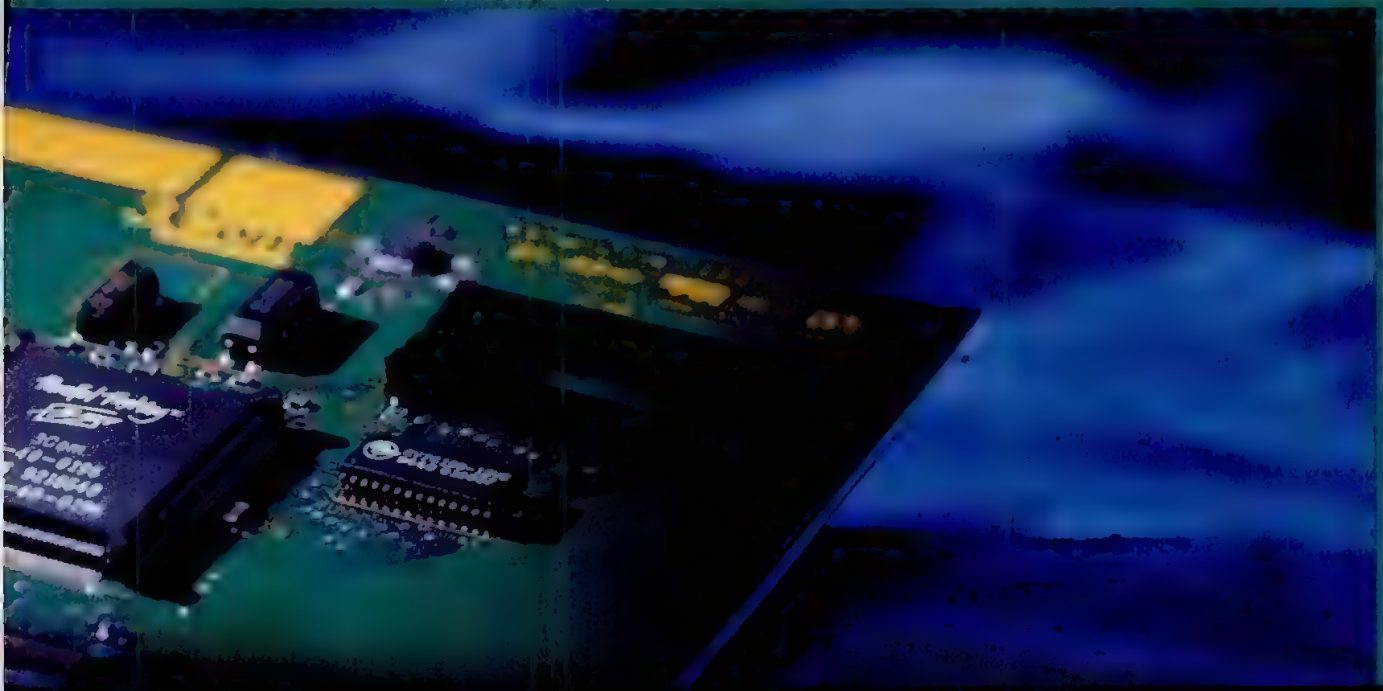
Like the rest of the EtherLink III adapter family, EtherLink III PCI comes with 3Com's patented Parallel Tasking® technology. So you're assured the fastest possible network performance. Always.

Plus, its bus master design offloads the system's

CENTRAL SITE ROUTERS WAN BACKBONE SOLUTIONS TOKEN RING SOLUTIONS

© 1995 3Com Corp. (408) 764-5000. 3Com, EtherLink, Parallel Tasking and Networks That Go the Distance are trademarks of 3Com Corp. To learn more, visit 3Com's worldwide web site at

SOLUTIONS PERSONAL OFFICE SOLUTIONS ATM SWITCHES ISDN SOLUTIONS



TOKEN RING ADAPTERS FDDI SOLUTIONS

come along since, well, our last five.

INTERNET SOLUTIONS NETWORK MANAGEMENT ATM SOLUTIONS

CPU so both clients and servers perform at optimal levels. And the EtherLink III PCI adapter card is guaranteed to be compatible with all PCI-compliant machines, or your money back.

Add full SNMP manageability and easy, virtually instant installation, and it's clear our newest member is fully living up to the family name. For more information, and to get a $59* EtherLink III PCI evaluation card, call **1-800-NET-3COM.**

3Com®

ASSIS HUBS REMOTE OFFICE SOLUTIONS

NETWORKS THAT GO THE DISTANCE

http://www.3Com.com *TPO version $59. Combo version $79. Limit one per customer location, while supplies last. Offer expires September 30, 1995

CIRCLE 874 ON READER SERVICE CARD

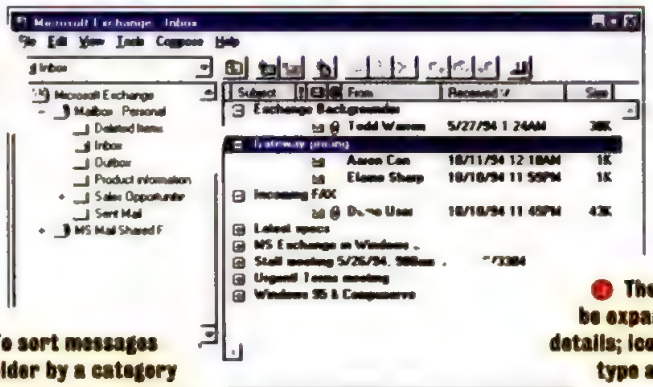
Dawn of the Universal Client?

By Tony Pompili

Holistic messaging—that's the promise of the Microsoft Exchange Client, a single interface to services and systems such as MCI Mail, CompuServe mail, The Microsoft Network, the Internet, faxes, and yes, the Microsoft Exchange Server. All messages are created, sent, received, read, organized, and deleted through a single interface. *PC Magazine* looked at the prerelease versions of the Exchange Server and Exchange Client, and we found them complex products that could unite all of your mishmash of mail, BBS, and local communications services into a single application.

With Exchange, you store all your messages—even those from different mail systems—in the same folders.

The Exchange Client: Bundle Your Mail



To sort messages in a folder by a category such as Subject, just click here on the column. You can also display discussion threads.

The outline view can be expanded to show more details; icons indicate document type and attachments.

IN YOUR INTERFACE

The Exchange Client will be built into Windows 95. Although Microsoft hopes it will be used frequently with the Exchange Server in a client/server mail system, the Exchange Client is designed to dovetail with a variety of Microsoft and third-party messaging services and systems including Microsoft Mail, the Internet, and CompuServe. (For an overview of the Exchange Server and Microsoft's messaging strategy, see "Four Paths to Messaging," *PC Magazine*, April 25, 1995.) In addition to the Windows 95 Exchange Client, Microsoft plans to ship Windows 3.1 and DOS versions, which we also had a chance to see.

Unlike yesterday's e-mail, the Exchange Client goes beyond the LAN. Sitting on top of Microsoft's existing mountain of communications APIs and services, the Exchange Client also, for example, will let you send and receive faxes through a fax application or dial up CompuServe to collect mail. As with network back-end services, the Client makes this happen with hooks into Microsoft's Telephony APIs (TAPI). This architecture for supporting local communications through the Client is also key to Microsoft's remote-access strategy. The Client will be able to dial into Exchange Servers and Microsoft Mail post offices using Microsoft's Dial-Up Networking, also known as Remote Access Services (RAS).

The Client has a look and feel similar to other upcoming Windows 95 products, such as Microsoft Mail and Lotus Notes, Release 4. The Client eases maneuvering among folders using File Manager–like tree structures. An outline of the folder contents appears in the View window pane to the right. Views are completely customizable; you can move columns and sort messages within each View.

The companions to Views are Forms, the templates used for entering messages. The Exchange Client comes with a series of default Forms, the most basic of which is a Microsoft Mail–like message form for creating e-mail messages. With the Exchange Server, Microsoft will ship Exchange Electronic Forms applications for Windows 95 and Windows 3.1 that create forms using Visual Basic code. Forms we saw allowed users to create buttons, tabs, and even graphics with pointer-sensitive hot spots.

The Exchange Client provides other basic capabilities, such as searching and filtering to process messages automatically. For example, similar to cc:Mail's Rules, a filter can automatically place

resource such as a subdirectory or a printer, you simply assign a password to that resource. Unfortunately, share-level security does not allow you to control access to individual files.

User-level security assigns a set of privileges to a specific user ID and provides file-level security. To implement user-level security, Windows 95 employs a concept known as *pass-through validation*, meaning the user information comes from a NetWare or Windows NT server. Pass-through security eliminates the need to reconfigure groups, user names, and passwords. You can use the same security design for your Windows 95 servers as you do for your Windows NT and NetWare servers.

If you are using file and print services for NetWare, then your validation server must be a NetWare file server. If you are using file and print services for Windows networks, then you will need a Windows NT server.

When you install user-level security, Windows 95 requires you to provide a NetWare or Windows NT server name. Windows 95 uses the pass-through security model to gather user and group information. To connect to a Windows 95 server configured for user-level security, you must have rights to either a Windows NT or a NetWare server on the same network.

If you do not have a Windows NT or a NetWare server on your network, you

messages from your boss in a high-priority folder.

The Client's drop-and-drag implementation makes it possible to file documents quickly and is especially interesting when storing application documents. When we dragged a Word document into the View pane, OLE properties such as document title and author came with it. These properties were then available as View columns, which means that documents could be organized according to the detailed information provided by the OLE properties.

Microsoft has established rich-text messaging with a vengeance. Both the Exchange Client and Exchange Server support a wide array of rich-text tools that allowed us to change fonts and paragraph formats, as well as other tools for bulleted and listed items similar to what's available in Word for Windows. The Exchange Server supports these rich-text formats, but not all third-party back-end services will support the same formatting.

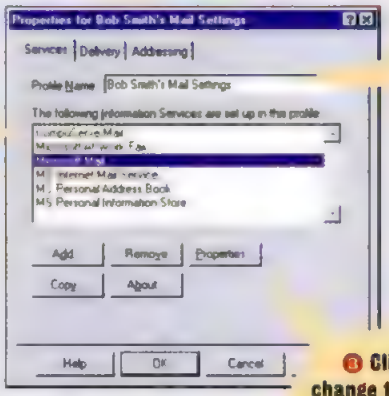
ONE FOR ALL

Besides working with the Exchange Server, the Client will snap into a wide range of non–Exchange Server services, including Microsoft Mail and CompuServe mail. Using MAPI 1.0 as the layer between the front end and back end, Microsoft's Service Provider Interface (SPI) will hook third-party services into the Exchange Client. Service Providers will come as drivers, like Windows printer drivers, allowing users to mix and match the services they use.

We were able to customize our own group of Service Providers by defining a user profile. An Exchange Client can have one or more profiles that tell the client what Service Providers to use. Microsoft has not announced which Service Providers will come with Windows 95, but support for Internet mail is expected. Other messaging services such as America Online, CompuServe, and SkyTel are currently working on their own drivers, which are expected to be available when Windows 95 ships. The Client will not include the Exchange Server Service Provider, available only to Exchange Server customers.

The SPI also lets providers add custom messaging features. For example, Exchange will allow users to create custom forms, such as an expense or contact management form. Exchange Server customers will get the Microsoft Electronic Forms development application to create these forms.

Pick a Profile—or Two



2 This lists the services that you can access using the current profile.

1 In your mail settings, you can set up multiple profiles; when you're on the road, Exchange can dial up your mail via modem.

3 Click here to change the properties of the information services.

THE COMPLETE PACKAGE

Because it acts like any other messaging provider, the Exchange Server manifests itself subtly in the Exchange Client. The most apparent interface feature of the Client is the Public Folders, which anyone with appropriate Exchange Server rights can create. We were able to create a public folder and assign permissions for using the folders. Public folders can be used as discussion databases or public document stores, similar in function to the local document folders in the Client.

To set up the Server you use the Exchange Administrator, a Windows 95 application. Like the Client, the Administrator displays the hierarchy of the Exchange network. To distribute network access rights logically, the Administrator divides server administration tasks by enterprise, site, and server. For example, you can allow local administrators to create and edit Exchange users at their site but not modify users' accounts at other sites.

We were able to create new users easily with the Administrator. Microsoft has built-in Windows NT hooks that turn what could be a multistep user-creation process into just a few steps. We could set Windows NT to bring up Exchange's new-user administration program automatically whenever we added a new NT user, instead of separately creating a NetWare user and then creating a user on the e-mail post office. □

can't implement user-level security. If that's the case, you'll find that other peer LANs such as LANtastic offer stronger security than Windows 95's share-level security. So the security of Windows 95 on its own is a mixed bag.

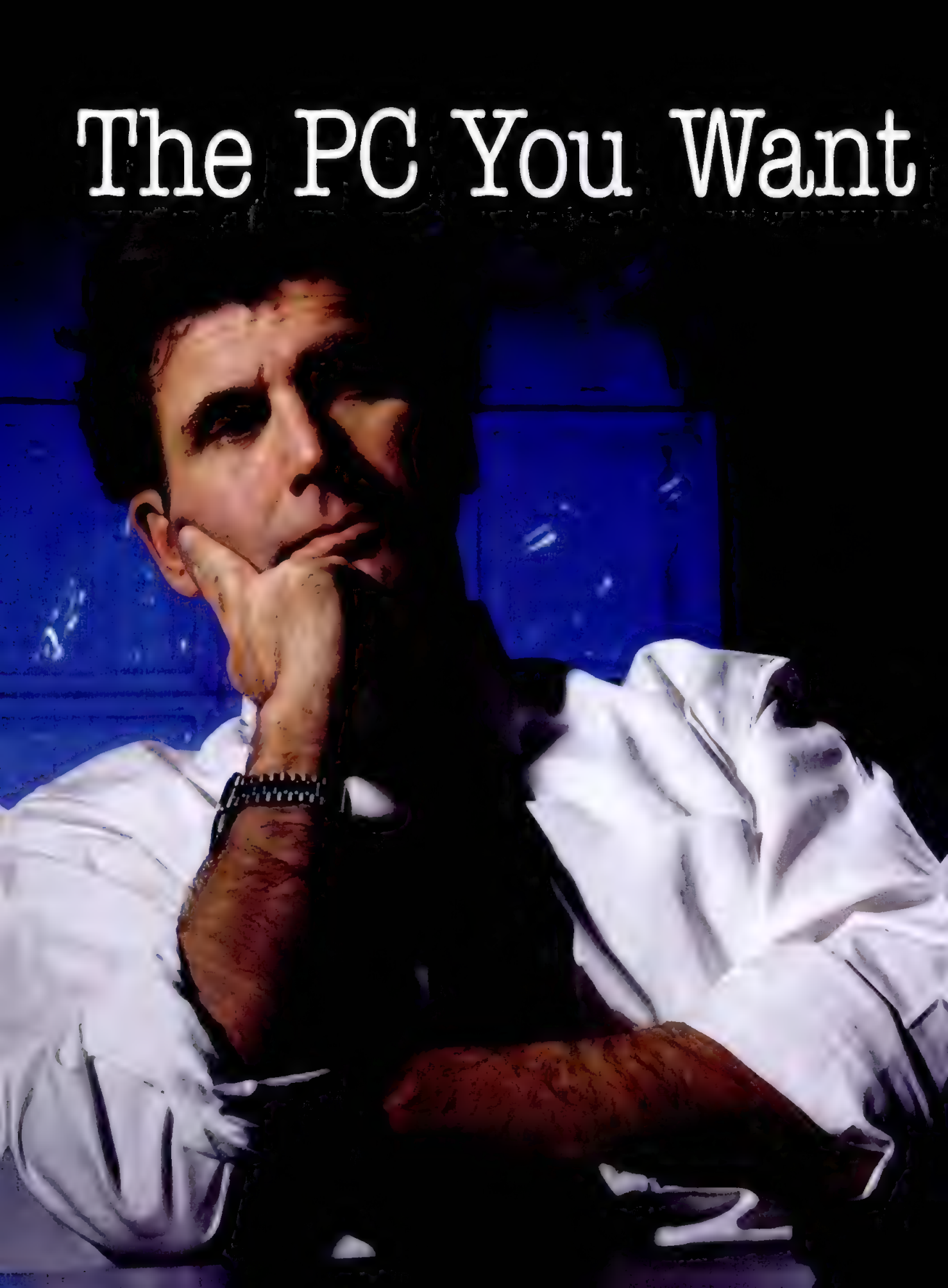
PEER-TO-PEER NETWORKING

As with Windows for Workgroups and Windows NT, Windows 95 lets you share files and resources with other similarly equipped users. Windows 95 goes further and lets you share files and printers with NetWare-based network clients. OS/2 Warp currently does not provide peer-to-peer networking, though IBM does have plans to add it in OS/2 Warp Connect.

Think of Windows 95's peer-to-peer services as a 32-bit upgrade to the same network features available in Windows for Workgroups. You can use the Windows file and print services in Windows 95 to share files, printers, and CD-ROM drives among networked PCs running Workgroups and Windows NT. You don't have to add any software to your existing Windows network, and you can use the same tools to connect to and browse your existing Windows network.

You also can connect all your existing NetWare clients to a PC running Windows 95. The Windows network in Windows 95 is a true peer-to-peer network, but the file and print services for NetWare clients that cannot be loaded with the peer-to-peer networking are based on

The PC You Want



Doesn't Exist... Yet.

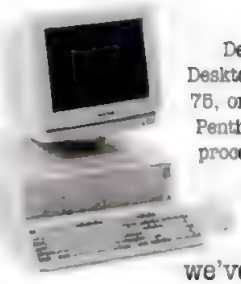
If you've scanned this magazine, you know that. Because the ads pitch off-the-shelf products to the lowest common denominator. If that isn't you, you should know about us.

Instead of competing for cookie-cutter volume, we serve sophisticated users. And our integrated order-assembly-distribution system was created solely for that purpose. As a result, we custom-craft PCs to your precise specifications, price them competitively, and deliver them quickly.

Virtually every PC manufacturer is attempting to emulate the systems we have in place. But only we were made to be what they want to become.

Create a Multi-processing Tower with twin 90MHz Pentium™ processors.

With us you choose the chassis, processing power, memory and monitor you want, add the features you prefer, and combine them with the peripherals you need. If your needs include notebooks, you'll find a full range of those to choose from too, including the most powerful Pentium™ machines.



Design a Desktop with a 75, or 90MHz Pentium™ processor.

We'll install proprietary or optional software in your custom-crafted system using computer-imaging to ensure accuracy, and pre-load the latest versions of MS DOS and Windows for Workgroups. Absolutely free!

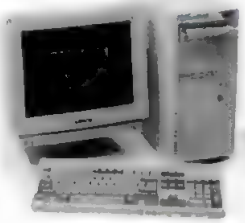
Our Risk-Free Guarantee ensures your satisfaction.

- ◊ 30-Day Money-Back Guarantee
- ◊ Lifetime 24-hour, 7-day Toll-Free Technical Support
- ◊ Remote Rescue Online Support
- ◊ 30-Day Price Protection
- ◊ One-Year Onsite Service On Desktops
- ◊ One-Year Limited Warranty
- ◊ Out-of-Warranty Repairs
- ◊ Lifetime BBS Support
- ◊ Onsite Installation Option
- ◊ Environmentally Sensitive Packaging

All this from a PC pioneer who's been in business longer than most every other advertiser in this magazine.

We consistently post one of the industry's highest reliability rates and get over 70% of our business from customers we've done business with before. One reason is that when a customer calls for technical help, a tech pro takes it in less than a minute!

Our knowledgeable representatives can help you design the system that best suits your needs, give you an exact price quote, and have it built, delivered and ready to run in less time than you'd spend running around looking at lookalikes.



Choose a Mini-Tower chassis that incorporates a Pentium™ 75MHz or 90MHZ processor and 8 expansion slots.

Tell Us What You Need!
Call Now!

1-800-456-3660

CompuAdd®
CUSTOMER DRIVEN. BY DESIGN.

12337 Technology Boulevard
Austin, Texas 78727

CIRCLE 126 ON READER SERVICE CARD

VERSION 4.0 IS HERE!
Call 1-800-866-8623 for details.

Although there's no rating system for desktop development tools, there *is* a *standard* unit of measurement.

These days, building applications for Windows® is the only way to succeed. And PowerBuilder® Desktop is the standard choice. Intuitive graphical painters and object-oriented features extend your development knowledge into a new environment. This comprehensive package includes a 32-bit Watcom™ relational database that allows you to develop SQL applications right out of the box. Our ODBC connectivity and unique Data Pipeline easily migrate your data from flat file to relational databases. And our Automated Technical Support with Infobase, FaxLine and CompuServe gets you to Windows® and keeps you there. Quickly and affordably.

Available at CompUSA, Egghead, Micro Center and other resellers. Or just call Powersoft at 1-800-866-8623.

Powersoft

Building on the power of people.

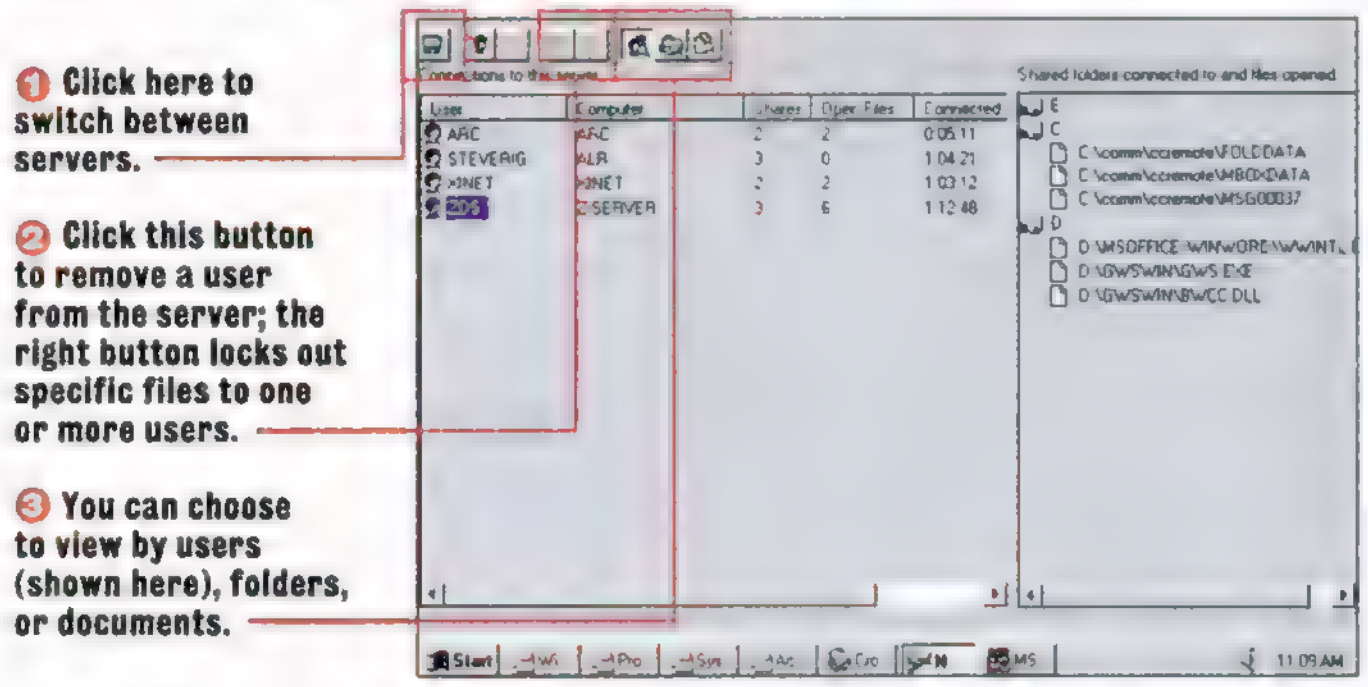
CIRCLE 345 ON READER SERVICE CARD

a server-centric model. Confused? That means any DOS- or Windows-based NetWare client can connect to a Windows 95 PC running file and print services for NetWare, but the opposite is not possible: A Windows 95 PC cannot log into a NetWare client.

As a peer-to-peer LAN, Windows 95 represents a considerable step up from Windows for Workgroups. At the same time, its functionality still falls short of what you'll find in standalone peer LANs such as LANtastic or PowerLAN.

Netwatch: Take Control

Network administrators can use Netwatch to monitor connections to any Windows 95 server on the network, and to track the files and applications they're using



MONITORING AND MANAGEMENT

In addition to security features, network managers look for management tools. Windows 95 has plenty, particularly Netwatch, System Monitor, Registry Editor, and System Policy Editor.

Netwatch lets you manage users' network connections to Windows 95 servers from a local or remote PC. You can connect to a Windows 95 server and monitor how many users are connected and what files they have open. You can even disconnect users remotely. Netwatch is a great tool for monitoring system performance and network usage. For instance, if a user complains of a slow PC, you can determine if too many clients are straining that PC's resources.

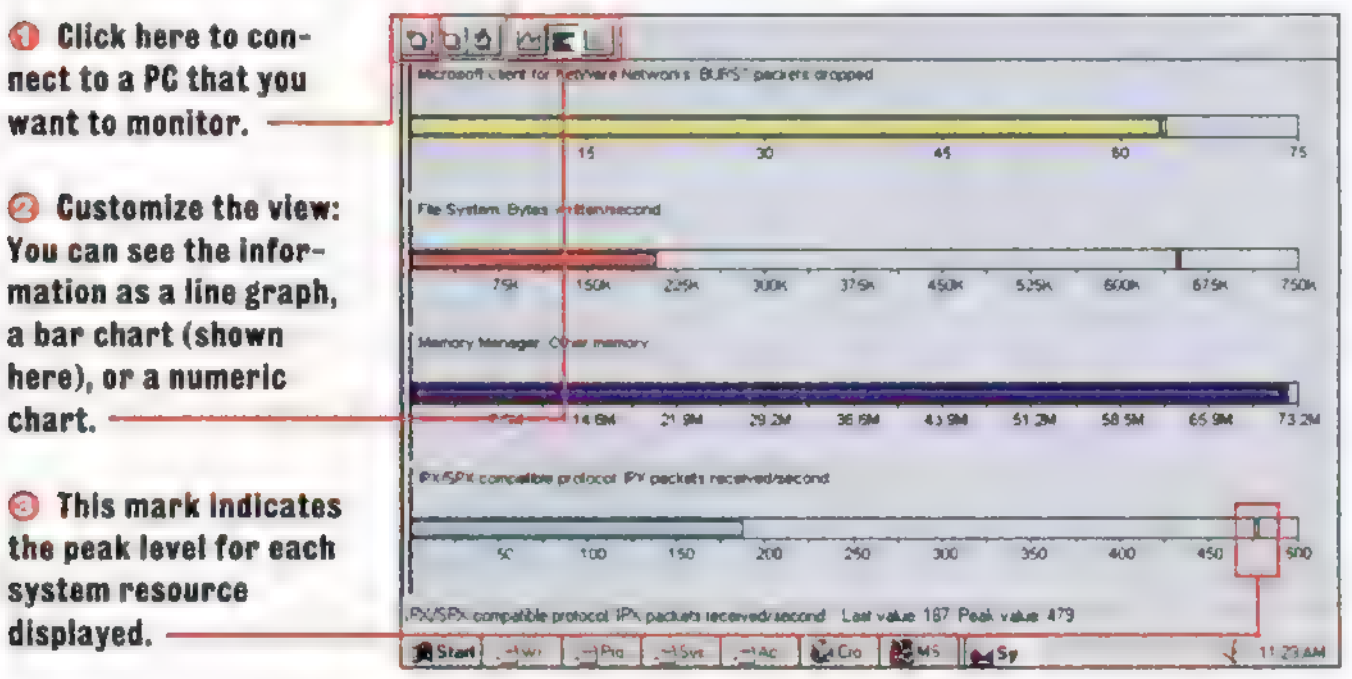
System Monitor lets you locally or remotely monitor all the system performance attributes on your Windows 95 PCs, including memory usage, cache, network packets, and a host of other useful data. The information is provided in a graphical format, and you can select a bar chart, numeric chart, or line graph. System Monitor is an ideal tool for troubleshooting.

To ease the transition to Windows 95 for the administrator, Microsoft has added a global database called System Policies within the Windows 95 Registry. You can set each user's interface and rights to certain network resources. You can even have different interfaces and network rights for multiple users sharing a single PC. By controlling what the users see on their screens, you can simplify some processes and eliminate functions that certain users should not have. For instance, you might want to prevent some users from offering up their PCs as servers.

In addition to the built-in management utilities, you can use a Simple Network Management Protocol (SNMP) console, such as HP OpenView for Windows, for remote management and control of your Windows 95 client PCs. The Windows 95 SNMP agent supports MIB II and an extensible MIB that developers can use to create custom MIBs for Windows 95 clients. You have probably heard about the Desktop Management Interface (DMI), but you won't be seeing it for a while: The DMI agent will not ship in the initial release of Windows 95. When it does, DMI products may take advantage of the more fundamental Plug and Play information file created by Plug and Play products.

System Monitor: Check Performance

The System Monitor replaces WinMeter. It allows you to track any of about 100 levels of system and network performance for any Windows 95 client or server on the network, locally or remotely.



NETWORK CLIENT OF CHOICE

As a network client, Windows 95 is top-rate, but upgrading will cost you time and money. The network features bundled with Windows 95 are impressive. You don't often see a single operating system that includes remote access, multiple protocols, and network drivers, as well as security, performance monitoring, and network management. Compared with the other operating systems we look at in this review, Windows 95 is definitely the network client to beat. It's ahead of Windows NT and clearly in front of OS/2 Warp, although the coming Warp Connect should narrow the gap. □

Lotus NOTES READY

YOU'VE GOT TOO MUCH ON YOUR MIND TO BE THINKING ABOUT WHERE YOU'RE GOING AND WHAT YOU'RE DOING.

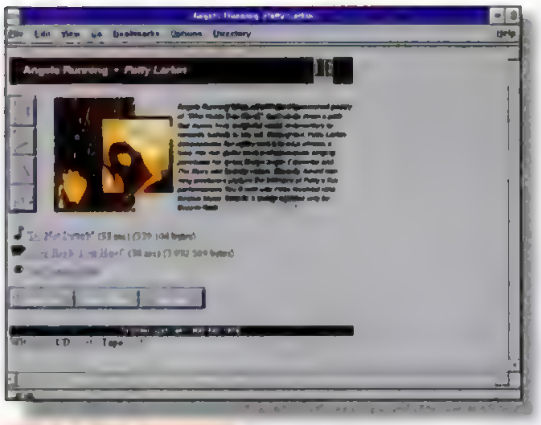
Face it. You're busy. You've always been busy. You're always going to be busy. So how do you make the best of it? With Lotus Organizer® 2.0 – the best selling personal information manager, improved and enhanced for even more fun. Yes, we said fun.

There is maybe nothing quite so satisfying as watching your frantic day fall into place on the pages of Organizer. The on-screen calendar, yearly planner, notepad, to-do list, phone call manager, anniversary reminder and address book work together, letting you prioritize tasks, cross out completed chores, set alarms for impending deadlines. And you haven't really lived until you've used the flaming trash can.

Plus Organizer works with your network to make scheduling meetings much, much easier. Almost a pleasure, in fact. Check out Organizer. Call or visit your local Lotus Authorized Reseller or call **1-800-872-3387, ext. A655*** for more information.

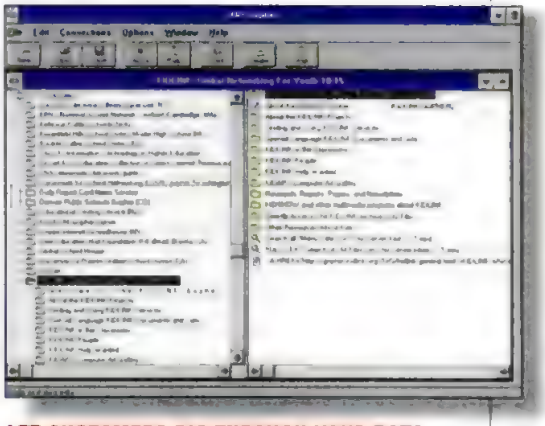
Lotus
Working Together®

*In Canada call **1-800-GO-LOTUS**. ©1995 Lotus Development Corporation. 55 Cambridge Parkway, Cambridge, MA 02142. All Rights Reserved. Lotus, Lotus Organizer and Working Together are registered trademarks and NotesReady is a trademark of Lotus Development Corporation.

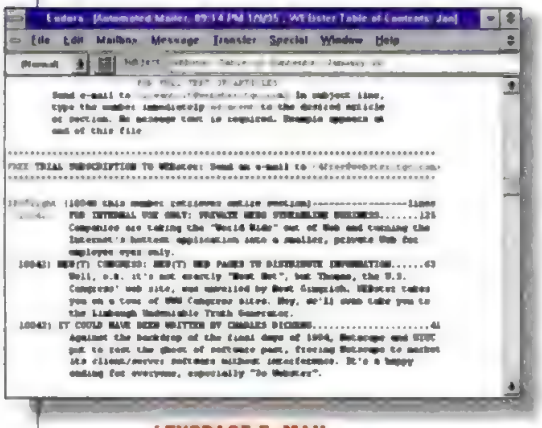


BUILD A WEB PRESENCE to give your customers a colorful way to get your information.

THE INTERNET MEANS BUSINESS



LET CUSTOMERS DIG THROUGH YOUR DATA to download entire documents or files.



LEVERAGE E-MAIL to give your customers an instant point of contact.

However you do it, establishing a business presence on the Internet is effective at extending your reach.

By Rick Ayre and Don Willmott

If you have spent any time exploring the Internet, you understand how newsgroups, World-Wide Web sites, and e-mail have given 20 million people access to an amazingly wide variety of information. Now comes the next step: How are you going to take advantage of the on-line world to let all those people know about your business? Thousands of companies have set up Web home pages in the past six months or so. Looking at them, you may wonder if it's already too late for you to stake your own claim. But there's no need to fear; the on-line revolution hasn't left your business in the dust. In fact, the tools that will help you give your business an Internet presence are just starting to appear in force.

The Internet was designed to connect people so that they could

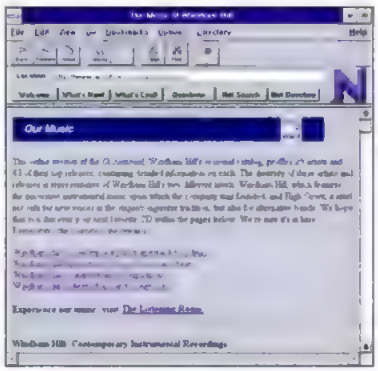
How Your Business Can Look on the Internet

You can make your business accessible to your customers over the Internet in a variety of ways. Each strategy has a different look and feel and serves a distinct purpose. To have a successful on-line presence, your business may need to experiment.

WORLD-WIDE WEB

Web servers offer a dynamic way to present information, letting users view text and graphics and even hear sounds. By using the Web, you can give your customers access to a wealth of information. From your home page, they can link to related pages of your choice.

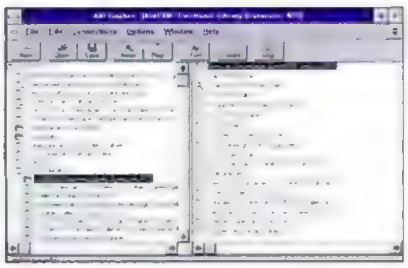
STEP 1 Windham Hill Records' Web home page uses graphics to welcome potential customers in a style they can readily identify with Windham Hill.



STEP 2 Using hypertext, users browse the system to get details about a certain style of music or to find artists they already know.

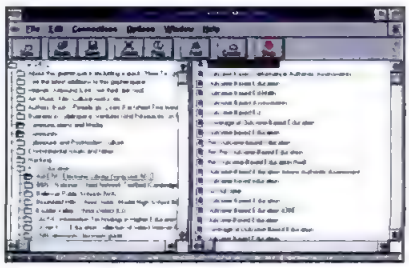
GOPHER SERVERS

Besides providing full-text indexing systems, Gopher servers help users quickly navigate mountains of text to find the specific documents they need.



STEP 1 ERIC (Educational Resources Information Center), a federally funded national information system, provides access to an extensive body of education-related resources.

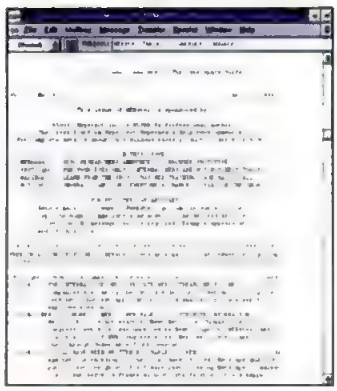
STEP 2 Gopher servers let users perform full-text searches, such as this one on the word *outcome*.



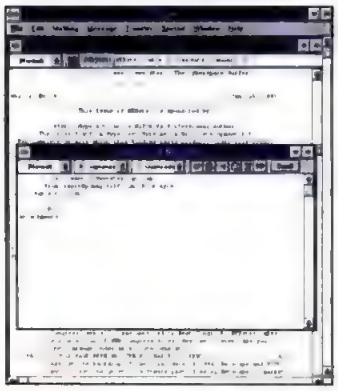
STEP 3 In this example, ERIC returns a list of documents that pertain specifically to outcome-related education.

E-MAIL SYSTEMS

E-mail response systems are built on Listserv-like software. A mailing list can be distributed to hundreds or even thousands of users—or subscribers—who want it. Then the response systems let users request just the data they want, making the mailing list both active and passive.



STEP 1 Every Tuesday, the WEBster table of contents is delivered to a subscriber's e-mail box. A subscriber can review items in the current issue.



STEP 2 Then the subscriber sends e-mail asking for a particular article to the WEBster e-mail robot.

STEP 3 Users can then listen to a sample from an artist's newest CD or see a video clip of the artist in concert.

STEP 4 Users can then open up the files they want and do the research they need.

STEP 3 The article is sent via return e-mail. There's no need to send any information that is not specifically requested by the subscriber.

IN THIS SECTION

The Internet's Explosive Growth 200
Highlights: Business on the Internet 200
Building a Web Presence 205
Digital Road Map for Windows NT 208
Microsoft Windows NT Resource Kit 213
NetPublisher 220
Editors' Choice 208
Suitability to Task 213
Is Unix a Better Place to Be? 214
Will Your Business Be Safe? 218
Three Routes to a Web Presence 224
Lotus Ties Notes to the Internet 228
Letting Customers Dig Through Your Data 233
What's Next for Servers? 237
Leveraging E-Mail 241
Successful E-Mail Strategies 244

communicate with each other—to get information from point A to point B. As a result, there are now tools designed specifically for the Internet that make it simple to manage the task of providing information. It's becoming as easy to be an information provider as it is to be an information consumer.

There are those who argue—largely as a result of the information services we talk about here—that the Internet is about to redefine advertising and marketing. An audience of 11 million U.S. Internet users is still no match for 200 million prime-time TV viewers. But when it comes to marketing, think of the Internet as more like a telephone than a TV. You make yourself available and users contact you.

The Internet provides a great way to publish a low-cost, tightly focused message to a technically knowledgeable audience. It fits like a glove if you are a company like Intel, for example. Soon, businesses will be using the Internet as a way to reach out to exactly whom they want to reach, in whatever demographic group they seek.

THREE WAYS TO GO

In this story, we look at three distinct methods of sharing your company's message with the Internet audience. In "Building a Web Presence," we look at products that help you set up servers for the World-Wide Web, where you will find the infomercials of the Internet, and the best place to grab, engage, and entertain an audience. Using a Hypertext Transport Protocol (HTTP) server, you can place hypertext documents in full view. Today people are using such servers on the Internet to provide information to large general audiences—and on their local area networks to provide information to people within their organizations. The Web is the place to be if you want to have a graphical impact, and want your information easy to use and navigate. Unfortunately, the tools for Web publishing are new and shallow, so Web publishing is not always the best base to build information services on.

In "Letting Customers Dig Through Your Data," we discuss strategies for publishing large amounts of primarily text-based information: Full-text search engines, for example, make it easy to pinpoint just the information you need from a large sea of data. Gopher servers provide a great way to organize and present text-based information that fits a hierarchical, tree-like structure.

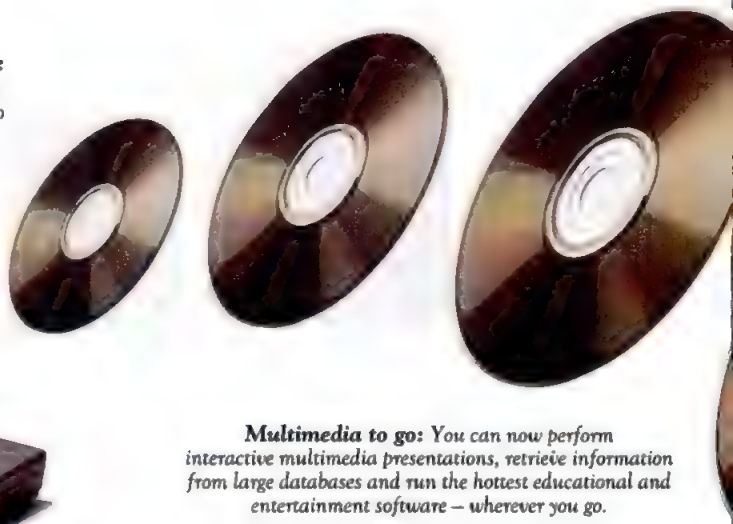
In "Leveraging E-Mail," we explore ways that e-mail, the virtual link that connects just about everyone on-line, is being used in novel ways to manage the information flow. Using the Internet's Listserv feature (or the Listserv-like Majordomo), companies are efficiently blasting information out to subscriber lists even while letting the subscribers specify what information they want to receive.

Combined, these three types of tools

Our Contributors: RICK AYRE and DON WILLMOTT are executive editors and BEN GOTTESMAN is a technical director at *PC Magazine*. JILL H. ELLSWORTH is the author of *The Internet Business Book* and *Marketing on the Internet: Multimedia Strategies on the WWW*. SEAN GONZÁLEZ is a systems support programmer at Information Access Company. KEVIN REICHARD has written 14 books for MIS:Press on various operating-system topics. TED STEVENSON was the senior associate editor in charge of this story, and AMARENDRA SINGH was the project leader.

THE NEW SATELLITE
MULTIMEDIA TO GO AT

You only need one computer: *With an optional Port Replicator you have one-step connection to your desktop environment.*



Multimedia to go: *You can now perform interactive multimedia presentations, retrieve information from large databases and run the hottest educational and entertainment software – wherever you go.*

Built-in power supply: *Engineered for ultimate portability, there's no bulky external AC adapter to carry, just a slim power cord.*

Expansion capabilities: *Two stacked PCMCIA slots (two Type I-II or one Type III) make room for on-the-road data/fax modems, networking adapters, hard drives and many more options.*

The power of multimedia is all packed up and ready to go. The affordable new Toshiba Satellite Pro™ T2150CD Series with a built-in CD-ROM drive is the ultimate in performance and portability. It has a super-quick 75MHz processor and an AccuPoint™ integrated pointing device. Plus it's loaded with everything you need for dynamic multimedia presentations, including built-in stereo sound and a brilliant 10.4" diagonal color display.

Satellite Pro™

$3749*

Prices starting at

Call 1-800-457-7777 for your nearest dealer.

T2150CDT
- 10.4" dia. color active matrix display
- 8MB RAM expandable to 32MB

T2150CDS
- 10.4" dia. color DSTN dual-scan display
- 4MB RAM expandable to 28MB

BOTH MODELS
- 75MHz Intel DX4™, 3.3v
- 520 Million Bytes (=500MB) HDD
- Integrated 5.25" CD-ROM drive
- Integrated math coprocessor
- 16KB of cache
- Two stacked PCMCIA (PC Card) slots (two Type I-II or one Type III)
- AccuPoint™ integrated pointing device
- VL local-bus video
- Integrated graphics accelerator
- External 3.5" floppy drive included
- NiMH battery with Toshiba MaxTime™ Power Management
- Audio jacks: headphone/speaker, microphone
- Sound Blaster™ Pro compatible, WAV and MIDI sound support
- Pre-installed software: MS-DOS®, Microsoft Windows™ or Windows for Workgroups®, Video for Windows™ Run Time and Indeo™ video
- 6.9 lbs.
- Multimedia help kit
- 3 year limited warranty
- Toll-free Technical Support – 7 days a week, 24 hours a day

intel inside

PRO™ WITH CD-ROM.
A PRICE YOU CAN TAKE.

In Touch with Tomorrow

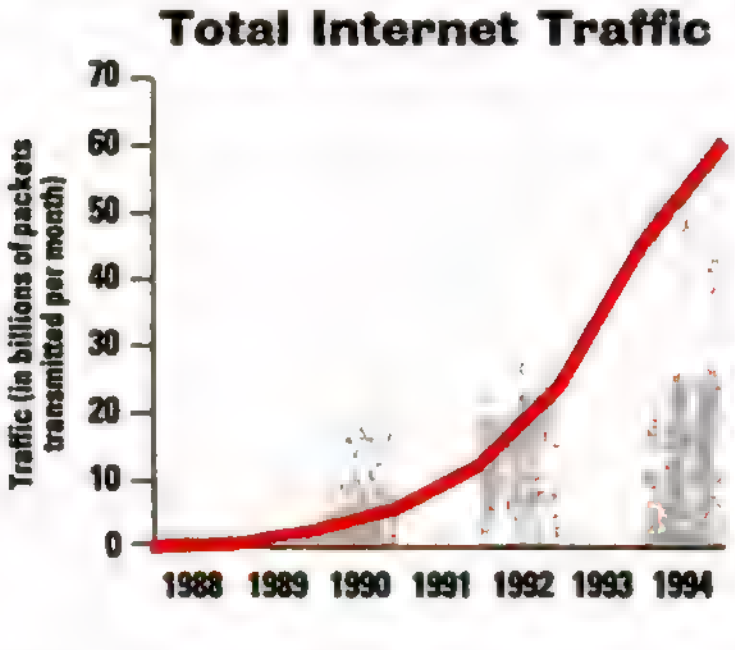
TOSHIBA

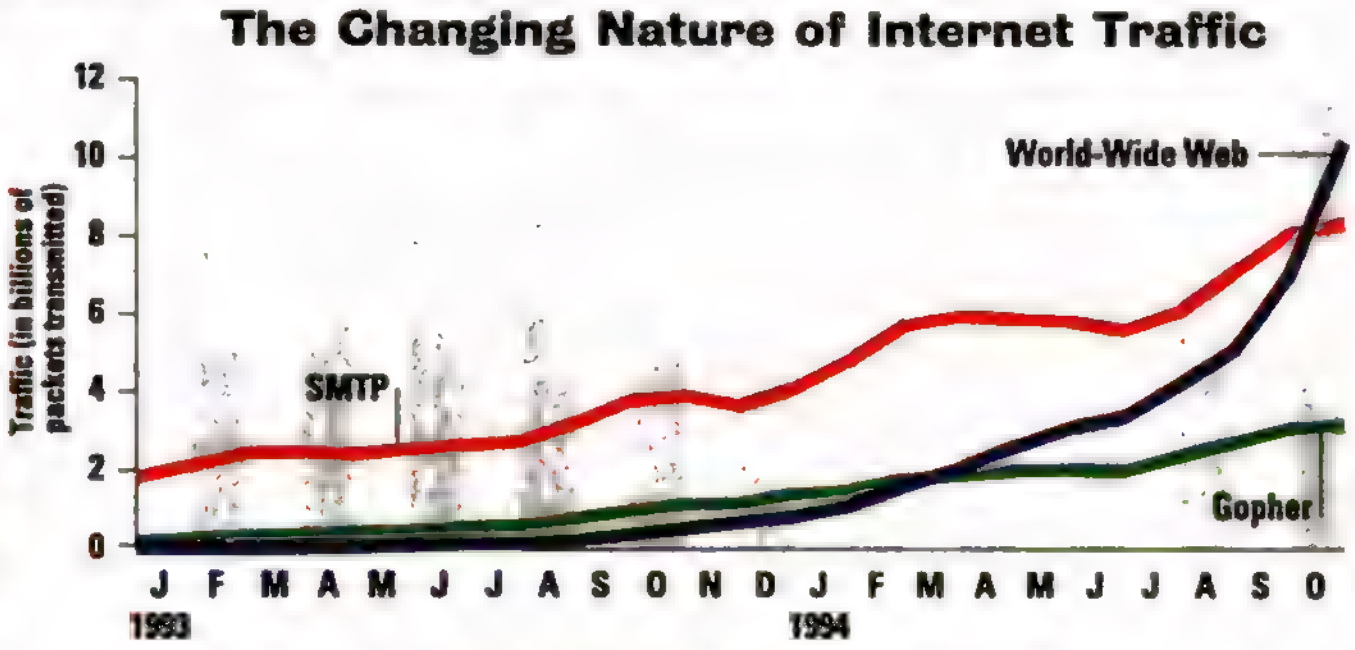
©1995 Toshiba America Information Systems, Inc. The Intel Inside logo is a trademark of Intel Corporation. All products indicated by trademark symbols are trademarked and/or registered by their respective companies. ★T2150CDS. Reseller prices may differ. All prices and specifications are subject to change. Shipping, handling, and applicable sales tax not included.

CIRCLE 379 ON READER SERVICE CARD

THE INTERNET'S EXPLOSIVE GROWTH

The graph on the left shows how total data traffic on the Internet has grown: from 85 million data packets a month in January 1988 to over 60 billion packets a month in January 1995. The graph on the right shows how three selected types of transmission have mushroomed over the past two years. Although the volume of regular e-mail and file transfers has grown steadily, it is the World-Wide Web that has suddenly become the fastest-growing part of the Internet, thanks largely to the recent availability of Windows-based Web-browsing tools.





add up to a complete information-management solution. Some are even easy enough to be used for self-publishing.

Like many other types of Internet-related software products, they are changing fast. The category is just now attracting commercial developers. Some of the servers have been around for years, but until recently, they've been available primarily for Unix systems and have been distributed in source code, with their developers charging little or nothing.

The products we discuss run on Windows NT. Unix products claim the majority of the market today, but they aren't easy to use, and many are targeted for just one operating system, like NeXTStep. For a discussion of the advantages Unix does have as a platform for Web servers, see the sidebar "Is Unix a Better Place to Be?" We also found one NetWare-based and two OS/2-based servers in prerelease; none were ready for evaluation.

HIGHLIGHTS

Business on the Internet

Don't make the mistake of ignoring the Internet as one component in your business's overall marketing strategy. Thousands of businesses have already staked on-line claims.

INTERNET TRAFFIC continues to grow at an amazing pace. Now is a good time, therefore, to start thinking about how your business can have a presence on-line. It's still early in the game, and there isn't much digital cash changing hands yet, so the best business use of the Internet is as a marketing tool rather than as a selling tool. The Internet is one more place where customers can reach out to get the information they need.

THE WORLD-WIDE WEB is the place to be if you want your business to have a truly interactive look and feel on-line. The cost of setting up a Web server will vary widely, depending on how much of the work you do in-house and how much you contract out. You can also set up an information server to let customers find and download files, or use e-mail to send specific information to individual customers.

THE PRODUCTS that make it possible to set up an on-line presence are just beginning to appear in Windows NT versions. Until now, most Internet server tools have been designed for Unix systems, but this is changing rapidly.

SECURITY is always a concern, and it should be. You don't want to expose your vital business functions to on-line outlaws. Fortunately, it's possible to set up firewalls and other security tools that can provide comfortable, though not perfect, levels of protection.

WEB SERVERS

To see Web servers in action, you need only visit a few sites we listed in our recent tour of 100 hot Web sites. (See First Looks, April 11, 1995.) One good example is Windham Hill Records' server at *http://www.windham.com*. This site gives you a clear picture of the kinds of things you can do on the Web that you can't do in conventional advertising and marketing: presenting sound and graphics, for example, or letting users pick the way they want to search the information.

The Windham Hill Web site demonstrates two more important concepts: First, as yet, you can't usually buy directly on the Web. Though you browse on-line to find the information to make a buying decision, you still need to call a toll-free phone number to order the recording you want. Second, the Windham Hill site was developed and is maintained by contractors who charge for the service.

If you're thinking multimedia—or need to show off dynamic data—think Web server. If you're a small company, think of contracting the Web site out. (See the sidebar "Three Routes to a Web Presence.") If you're thinking of

The OL410e prints presentation-level output at a simple-text-and-graphics price.

It's designed for laser class output so you can print great looking sales presentations, newsletters and direct mail flyers easily and affordably.

The LED printhead carries a 5 year limited warranty and the print speed is a fast 4 pages-per-minute.

And there's also a Mac version with Adobe PostScript — the OL410e/PS.

To take advantage of this opportunity at a dealer near you, call 1-800-OKI-TEAM, ext. 564 (U.S. or Canada).

The

OKIDATA

OL410e and 410e/PS

Personal Printers.

YOUR BUSINESS HAS NEVER LOOKED BETTER.

©1995 Okidata. Okidata Reg. T.M., M.D. Oki Electric Industry Co., Ltd. Adobe, PostScript are trademarks of the Adobe Systems Corp. which may be registered in certain jurisdictions.

FileABC

Regular Price $395.00

Limited Time Offer
NO RISK MONEY BACK GUARANTEE
$99.95*
BEST BUY
For the First 100,000 Sold

A Quantum Leap in Document Imaging and Management.

FileABC is the industry's lowest priced, high performance document imaging and management program. FileABC is a comprehensive, easy-to-use software solution that uses the PC equipment you already own (and if you don't have a scanner, just use your fax/modem.) Install it *yourself* and start right away. Whether you are a single user, or part of a client-server network, FileABC will work for you.

Features include:

Image Capture
- From scanner or fax
- From import/export programs
- As singles, batches, or quick single sheets

Indexing
- Allows user to create and customize their own search indices
- Can be completely automatic, manual or any combination
- Indexing at scan time optional
- Automatic indices include date of scan and batch or ID number
- Optional keyword indexing through DDE, OCR and Bar Code

Archiving
- Archive to CD-ROM, Optical Disk or Magnetic media

Retrieving Images
- Retrieve single pages, multiple pages, entire documents or combinations
- Retrieval assisted through the Thesaurus feature
- Print or fax your documents, or export to other applications

Editing your documents
- Attach "sticky notes" to your documents. Notes can be printed with document
- Annotate your document. Write, type and highlight directly on your documents
- Annotations and highlights can be printed
- Document rotation and zoom features

MICROSOFT WINDOWS.

yes It runs with NetWare

FileABC™
The Easiest Way to Manage All Your Documents

Call 1-800-366-4464

Fax orders (602) 942-5189 or send your order to:
FileABC • P.O. Box 41728 • Phoenix, Arizona 85080
***Add $14.95, Shipping/Handling and Tax.**
VISA, MasterCard, Discover and American Express

Copyright ©1995, FileABC. A Nevada Limited Partnership. All rights reserved. All other trademarks are the sole property of their respective companies. Developer tested only. Novell makes no warranties with respect to this product.

CIRCLE 243 ON READER SERVICE CARD

buying and running your own Web server, read our evaluations of HTTP servers from Ameritech, Digital, and Microsoft. And if you're wondering how you get information into an HTTP server, see our recent story on electronic publishing ("Publish Without Paper," February 7, 1995).

INFORMATION SERVICES

Of course, you need to use the right tool for the right job. As exciting as it is, the World-Wide Web isn't necessarily the right place to be if your purpose is to give people easy access to large quantities of data. Large legacy data sets are best distributed using other tools, like full-text search engines and Gopher servers.

These tools are being used today by the likes of O'Reilly and Associates (creators of "The Whole Internet Guide") to give customers access to its full catalog of Unix books, as well as information about each.

Full-text search engines are used on their own to search across wide swaths of indexed data, or they are being combined with HTTP servers to let users search the Web pages for the specific content they need. Just because these tools aren't quite as visual as a Web browser doesn't mean they aren't useful or won't be popular with your customers or clients. They're industrial-strength tools that do the real work of searching and indexing. Managing the information revolution depends on them.

DON'T FORGET E-MAIL

What do WEBster, WinNews, and GINA have in common? They're all subscription newsletters that are managed by mailing-list software. WEBster's subject matter is the Web, and subscribers must pay to get the publication. WinNews is a Microsoft newsletter sent out from time to time to update subscribers on the latest developments in Windows 95. GINA is a public relations newsletter for the press put together by a high-tech marketing company.

WEBster and GINA share an interesting format: Each is sent out as a list of topics. You then send e-mail to a mail "robot," asking for the articles you want. Only the text you ask for is returned to you via e-mail. That way, your mailbox isn't cluttered with useless news, and no one is required to know ahead of time just which items you're going to want.

These are just a few ways that companies are leveraging the fact that the majority of people with PCs now have an e-mail address. But don't expect to have any human conversations with mail robots. Like most computers, they can only answer the questions they expect you to ask.

There's no way to predict with any certainty just how the Internet, and the communications technologies that flourish on it and because of it, will change the way we do business. One way to prepare for tomorrow is to use what works today. Though we look at three strategies in the following stories, don't conclude that you have to choose just one type. Your perfect set of information services will likely be some unique combination of the three.

We made them what they are today.

(Actually, we made them what they were yesterday too.)

If you're buying a used IBM, use the old noggin. Buy it from the people who made it, IBM. We refurbish our used computers using nothing but genuine IBM parts. And we offer a 90 day satisfaction guarantee. Fax 203-973-5649. Or call for details:

1-800-IBM-5440, X104

IBM Credit Corporation

CIRCLE 227 ON READER SERVICE CARD

4·25·95

TIMBERLAND

STRATHAM, NH

Today, Timberland is blazing trails in apparel, with help from Lotus® Notes software.

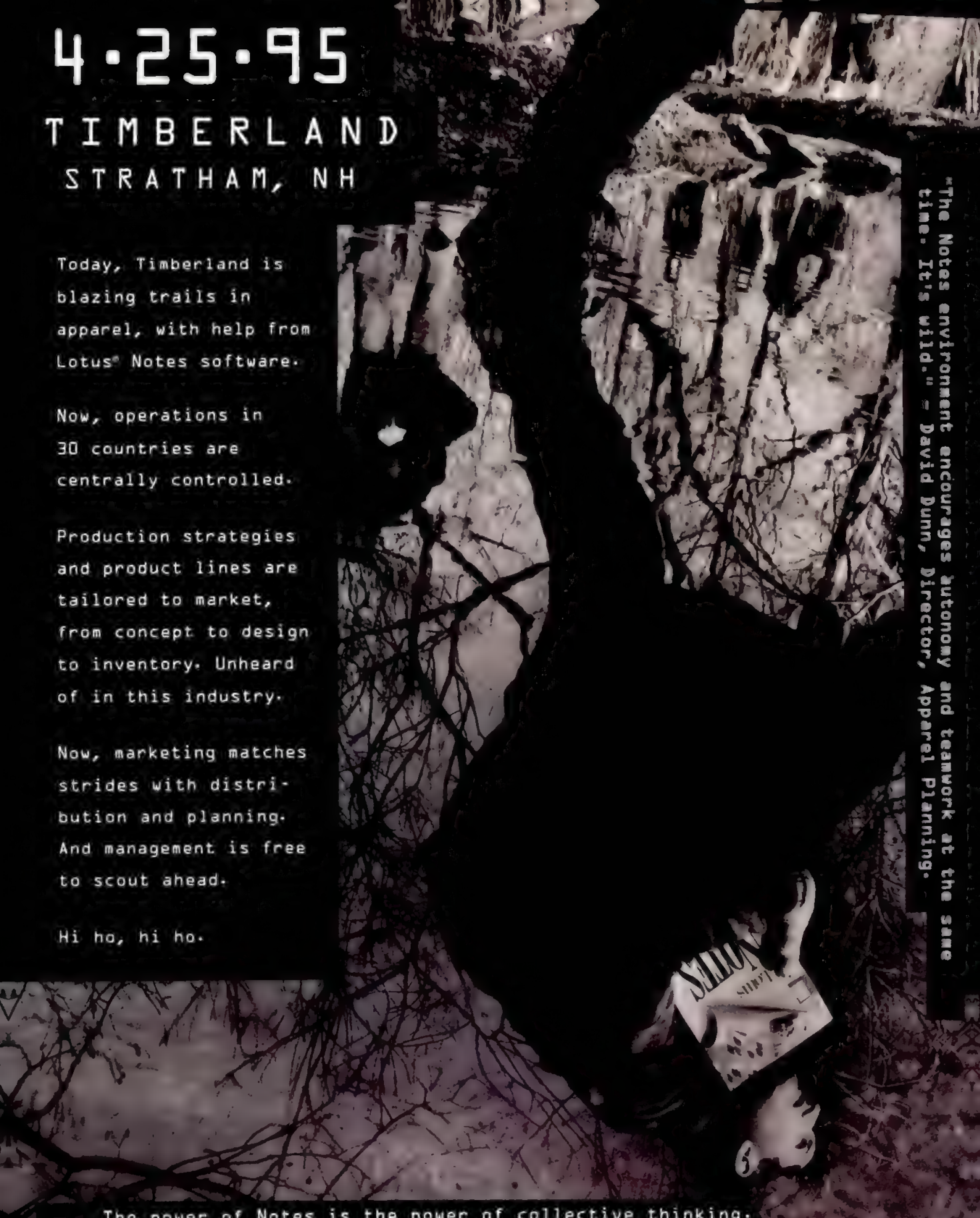
Now, operations in 30 countries are centrally controlled.

Production strategies and product lines are tailored to market, from concept to design to inventory. Unheard of in this industry.

Now, marketing matches strides with distribution and planning. And management is free to scout ahead.

Hi ho, hi ho.

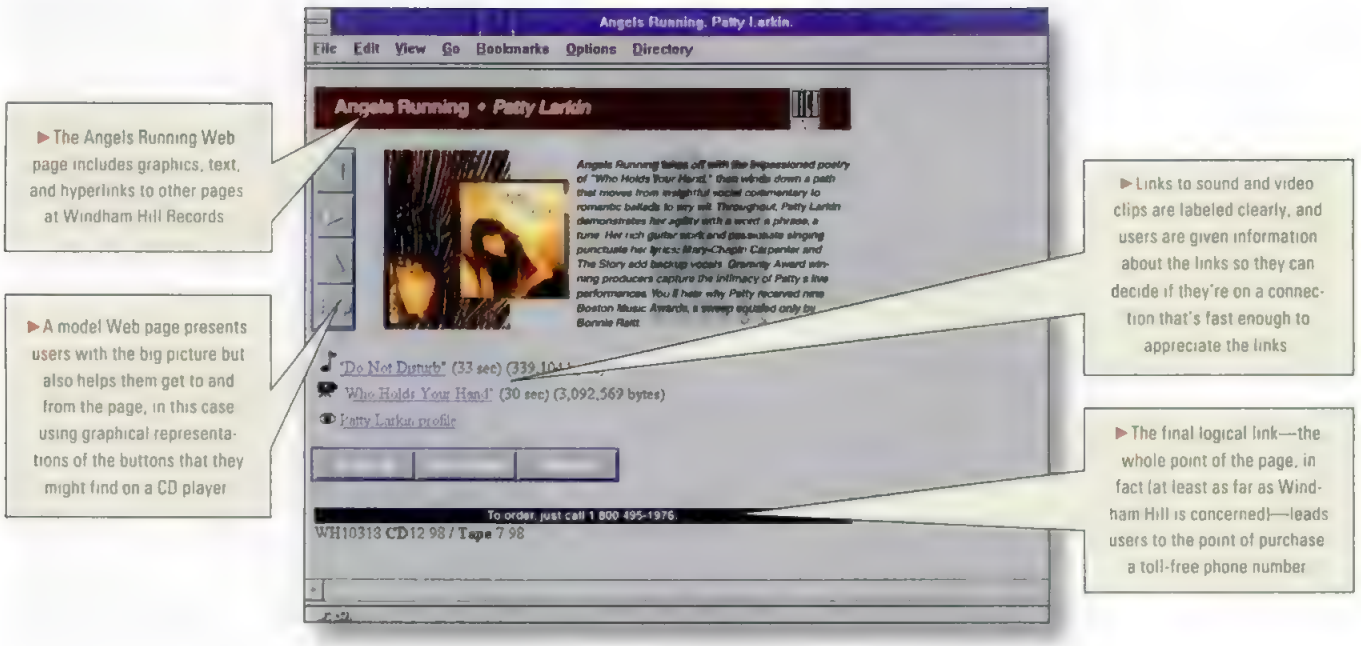
"The Notes environment encourages autonomy and teamwork at the same time. It's wild." – David Dunn, Director, Apparel Planning.



The power of Notes is the power of collective thinking.

For our free Discover Notes video and a copy of the IDC report on Return on Investment associated with Notes, call **1-800-828-7086, ext. A691.** In Canada, call 1-800-GO-LOTUS. Internet address: http://www.lotus.com. ©1995 Lotus Development Corp. 55 Cambridge Pkwy, Cambridge, MA 02142. Lotus Notes and Working Together are registered trademarks of the Lotus Development Corporation. All companies are registered trademarks of their respective companies. Notes installation by Synetics Corp. Apparel planning application developed by Timberland Information Systems group.

Lotus
Working Together®



Building a WEB PRESENCE

By Sean González

You can get a big jump on your business competition by establishing a "presence" on the Internet to advertise your products, publicize your business, or sell information and information access.

The World-Wide Web is the most popular of several Internet services you might use to gain such a presence. Its Hypertext Transfer Protocol (HTTP) and Hypertext Markup Language (HTML), working together, let you build electronic documents that can, in turn, harness the power of other Internet protocols like SMTP, File Transfer Protocol (FTP), Gopher, Wide Area Information Service (WAIS), and telnet.

Using these tools you could, for example, build a system that handles multiple sales chores automatically. It might begin by sending to customers who request your Web home page an HTML document that lets them select *Product Sales* from a list of choices. The server could then return a page with descriptions—even pictures—of your products, plus pricing, an e-mail address for a sales contact, and the option to download a complete catalog. This system would use a number of protocols to carry out its various tasks. If a customer clicked the sales contact e-mail address, for example, SMTP would carry the message. If he requested a copy of your catalogue, it would be sent via FTP. It's even possible to build in real-time customized views of your content using powerful search engines like Gopher and WAIS.

BIG COMMERCIAL POTENTIAL

The software actually managing the links between your various HTTP-served documents would be a background routine running on the HTTP server. In Unix parlance, this is called an *HTTP daemon;* in the Microsoft Windows NT world, it's called an *HTTP server.*

Responding to the explosive growth of the Web as a business venue, commercial developers have begun to build and offer new and improved HTTP service modules at a sprightly pace. In this article, we review three native Windows NT–based HTTP servers. Any of these products can handle the basic job of maintaining your HTML documents on the Web, but their extra features will determine how easy this turns out to be.

Few products are available for Windows NT today, and though the ones we reviewed should satisfy many users' needs, the issue of security hasn't been adequately addressed in any of them (see "Is Unix a Better Place to Be?"). NetPublisher, Version 1.0, offers great value-added content-management features to build searchable content and unsurpassed graphical editing tools; this server is most suitable for library and editorial content. HTTPS is a general-purpose server that will meet most users' needs. SerWeb is a basic, introductory-level server that will help beginners get started on the Web quickly and effortlessly.

Today there are a limited number of products available, and each has a very dif-

AST • COMPAQ • COMPUDYNE • IBM • NEC • DIGITAL • TOSHIBA • EPSON

Your direct line to the power of the Pentium™ Processor.

Save big by calling CompUSA Direct.

CompUSA Direct is the fast, easy way to buy computer products, because we put the nation's largest Computer Superstores™ at your fingertips! Just check out these unbeatable prices on the latest in powerful Pentium™ Processor computers. Our free catalog lists over 5000 computer products, and you can order 24 hours a day, 7 days a week. CompUSA service representatives are eager to help. So for guaranteed low prices* on today's best computer products, call CompUSA Direct at

1-800-COMP USA
(1-800-266-7872)

COMPUDYNE

75 MHz Pentium™ Processor Minitower Computer

- 8 MB RAM • 850 MB HD • 1 MB PCI Video Card • Quad-Speed CD-ROM Drive
- DOS/Windows • Mouse • Keyboard

#656352 *Monitor sold separately*

$1,699.99 *Lease now for only $63/mo.**

Compudyne 14" .28 NI Monitor #289691 $239.99

COMPUDYNE

90 MHz Pentium™ Processor Minitower Computer

- 8 MB RAM • 850 MB HD • 1 MB PCI Video Card • Quad-Speed CD-ROM Drive • DOS/Windows • Mouse • Keyboard

#656354 *Monitor sold separately*

$1,999.99

*Lease now for only $74/mo.**

Compudyne 15" .28 NI Monitor #289690 $299.99

COMPUDYNE

100 MHz Pentium™ Processor Minitower Computer

- 16 MB RAM • 1.2 GB HD • 2 MB PCI Video Card • Quad-Speed CD-ROM Drive
- DOS/Windows • Mouse • Keyboard

#656321 *Monitor sold separately.*

$2,499.99

*Lease now for only $93/mo.**

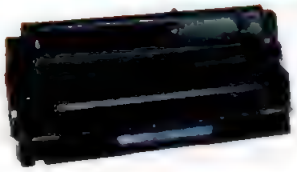
Compudyne 17" .28 NI Monitor #588171 $649.99

DELL • HEWLETT-PACKARD • APPLE • SHARP • SONY • INTEL

BizPlan Builder/Win.

Everything you need to create a winning business plan that sells your idea. Use your own word processor to fill-in blanks, edit names and places and more. #571991

$79.99



HP LaserJet 4L Toner

Specifically designed for the HP 4L Printer, this toner cartridge produces quality printing page after page. #945763

$59.99

Hewlett-Packard Hi-Capacity Black Ink Cartridge

Use this genuine Hewlett-Packard replacement cartridge for quality printing every time. #481661 Limit 4 per customer.

$22.99

Bulk 3½" DS/HD Formatted Diskettes

Great for high-volume users, at home or the office!

- 50-pack
- Labels included
- Lifetime warranty #660582

Price Before Rebate $17.50
mail-in rebate 5.00
$12.50

Mosaic Plug-n-Play/Win.

If you've got a modem and Microsoft Windows, you're ready for Mosaic. It's the "killer app" that makes the Internet easy to use. #640151

$24.99

Lotus Organizer 2.0/Win.

Easy to use because it works like a traditional paper organizer, then adds special Lotus features like SmartIcons and mail capability. It's easy to plan your appointments, manage your time, stay on top of contact lists and notes. #617513

$99.99

PC Accessories 2-Pack Surge Protector

Protect your computer!

- 3-wire grounded outlets
- Full protection for voltage spikes, surges and other damaging electrical disturbances

#487725 Limit 3 per customer

$9.99

3M 3½" DS/HD Formatted Diskettes

Factory formatting ensures quality • 10 Pack #843163

$5.99

Limit 5 per customer

Ordering is fast and easy!

Order 24 hours a day, 7 days a week.

CompUSA is always ready to take your order... and get it to you as quickly and conveniently as possible.

Special Orders Available!

Over 25,000 products.

Call for a free catalog.

To place an order or for a free catalog listing over 5000 computer products call 1-800-COMP USA.

Standard Delivery.

For a nominal fee, we'll ship your order anywhere in the world within 5 to 7 working days. Restrictions apply.

Next-day Delivery.

We'll be happy to ship your order for delivery by the following day (except Sundays). Additional delivery charges apply.

Fax orders welcome!

You can fax your order anytime! Fax 1-800-FAX-2212.

3 Year On-Site Service Plan

Includes on-site service and 100% of parts, labor and shipping for most products. Continental U.S. only. See store for details.

Technical Support Hotline

1-900-896-9393

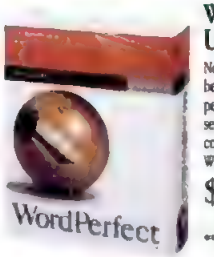
$2.00 per minute, first minute free. Available M-F 8-9, Sat. 9-6, Sun. 12-6, CST. We can answer your questions, even if your computer products were purchased somewhere else.

Government Hotline 1-800-468-4682

GSA Schedule GS 00K94AGS6319

International Orders: 1-214-888-5770

International Fax: 1-214-888-5760



WordPerfect 6.1/Win. Upgrade

New enhancements help you write better, work smarter and integrate perfectly! • Corrects and rewrites sentences • Saves time creating common documents • Help for WordPerfect DOS users #580592

$89.99**

**Certain upgrade restrictions may apply

Reachout Remote 4.0/DOS

The fast and easy way to control PC applications, data files and peripherals from a remote PC. Offers powerful security and file management features. It's perfect for telecommuting, training and anyone on the go #492461

$139.99

24 lb. Hammermill Laser Print Paper

When quality counts, you'll want to use these premium laser sheets. • 8½" x 11" • 500 count • Extra bright #851581 Limit 10 reams (1 case) per customer.

$4.99

COMPUSA DIRECT℠

1-800-COMP USA

(1-800-266-7872)

**If you find a lower price on a product in this ad in the current issue of this magazine we'll beat it. Guaranteed. Offer good on all new in-the-box products of the same brand and model number that are available in stock from any other authorized mail order competitor. It does not apply to competitors' misprints, one-of-a-kind or other limited quantity offers or when a bonus or free offer is included in the purchase. CompUSA Direct prices are available through mail order only and are valid until the next issue of this magazine, or 30 days from the date of this issue, whichever comes first. Prices and specifications are subject to change without notice. We reserve the right to limit quantities. All Hayes modems and laser printers, and some other printers, monitors and laptops must be sent to authorized service centers. Due to manufacturer's restrictions, certain products may not be eligible for international shipment. The Intel Inside and Pentium Processor logos are trademarks of the Intel Corporation. Apple is a registered trademark of Apple Computer, Inc. All trademarks belong to their registered owners. CompUSA is a registered trademark, and CompUSA Direct and the Computer Superstore are registered servicemarks of CompUSA, Inc. CompUSA Direct, 15167 Business Avenue, Dallas, TX 75244. Defective merchandise may be replaced with the same item only. We want you to be satisfied with your purchase. If for any reason you are not satisfied, please return the item within 30 days with original receipt or invoice. Opened software may be returned for exchange only. A 15% restocking fee will be charged under the following conditions: missing boxes, packaging or accessories; installed toner or inkjet cartridges; or non-defective laptop returns. All refunds in excess of $250 will be sent via check from the CompUSA corporate office within 10 days. ©1995 CompUSA Inc. †Leasing arranged by Leasing Group, Inc. For business use only. Prices based on 36-month, open-end lease, 10% purchase option*

5594-05-95 PCM0595

CIRCLE 144 ON READER SERVICE CARD

ferent focus. Expect to see a follow-up roundup as more companies release Windows NT versions of their servers. Things will change quickly in this market.

Digital Equipment Corp.

Digital Road Map for Windows NT

BY SEAN GONZÁLEZ

Of the products we evaluated, Digital Road Map (DRM) for Windows NT has the best collection of Internet utilities for building a robust World-Wide Web server. This freeware CD-ROM from Digital Equipment Corp. is a superb one-stop tools-and-information resource, and the Internet utilities aren't its only attraction. The general-purpose utilities that are included will help increase productivity on your Microsoft Windows NT system, and DRM's many ports of Unix commands will give you a smooth migration path.

DRM is much simpler to use than any other product we reviewed. Because it's organized using HTML documents, you just type "roadmap" in Program Manager's File|Run dialog and Digital's Web browser takes over. From there, you can access the entire CD-ROM. If you're a novice Web manager, this is a great way to learn how to use a Web browser and the Web itself.

Installing selected complimentary software couldn't be easier. Each product is listed separately and by category in one of the pseudo-Web pages on the CD-ROM. By selecting a product, you get a page that includes a brief product description, a link that invokes WinZip (a copy is included with the product) to view or extract the contents of the distribution .ZIP file, a contact's phone number or e-mail address, the FTP site where the distribution can be found (great information to have if you need technical support or an upgrade), a link to the product documentation, and another link to execute the product if it can run from the CD-ROM.

LEARNING THE WEB

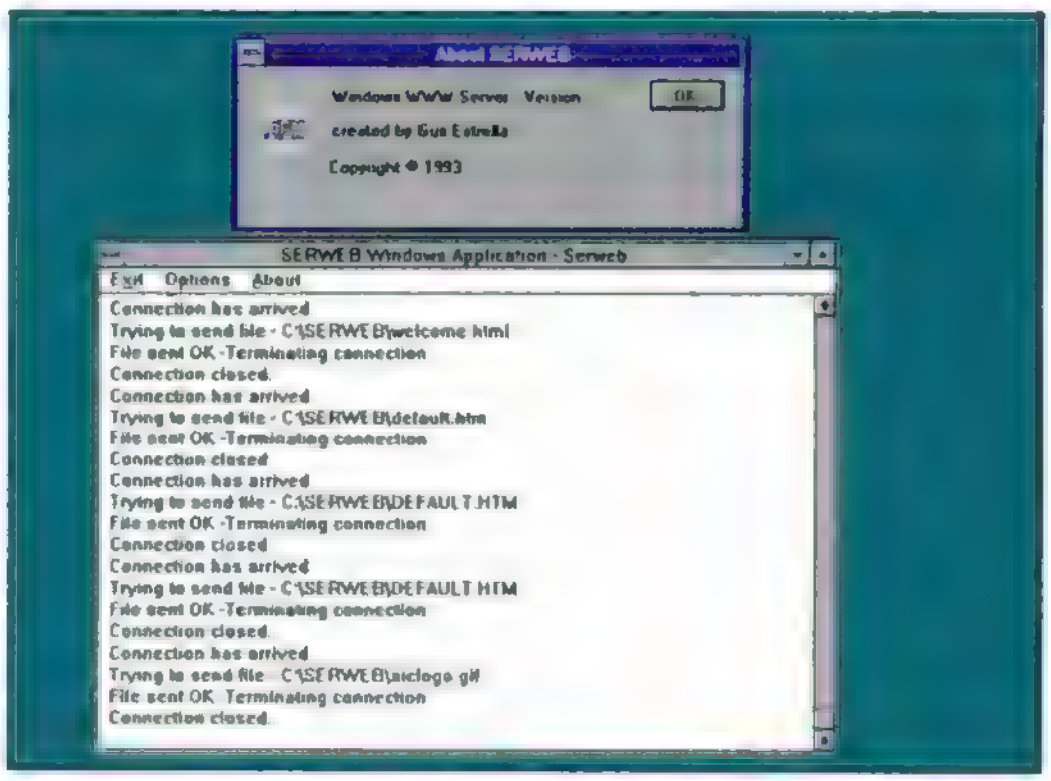
In addition to information on Digital software and hardware products and complimentary software, Digital Road Map for Windows NT contains excellent Web documentation. It explains in great detail such items as Uniform Resource Locators (URLs), Uniform Resource Identifiers (URIs), HTML, and HTTP specifications.

Digital has put together all the elements that you need to become a Web expert without ever having to scavenge the Internet for the information. Everything you need to build and manage Web content is right at your fingertips. DRM includes copies of several HTML tools, such as restricted versions of HoTMetaL, HTML Assistant, and other Windows HTML editing tools (for more information, see "HTML: Nothing but Net," February 7, 1995).

If you come from a Unix environment, you'll appreciate the many ports of Unix development tools. Several scripting languages, such as CSH, Perl, and the Tool Command Language (TCL), are included. Also included are several Unix commands and Whaley, a collection of command-line utilities such as CAT, CHMOD, CP, and DU.

GETTING SET UP

To set up your Web server, DRM includes several Internet protocol servers—HTTP, WAIS (Wide Area Information Service), Gopher, Finger (a protocol that allows remote users to get information about local users—it's usually considered a security risk, so you may not want to use it), and even a telnet daemon tool. But like the Microsoft Windows NT Resource Kit (reviewed separately), DRM doesn't include an SMTP server.



SerWeb, included with Digital Road Map for Windows NT, is a decent tool but isn't for building a heavy-duty World-Wide Web server.

• NetPublisher

This is a young and growing category; within a year there could easily be three times as many Web-server competitors. Today, the best overall solution is Ameritech Library Services' NetPublisher. No other Web server product is as good at managing your Web content, especially if you're a novice with the Web.

To use NetPublisher effectively, you must use its editor to structure your data in the hierarchical way that it requires. You may find this process imposing and confining, but the effort is worthwhile. The tools you get are excellent, especially the image-map tool that lets you build clickable graphics for your Web pages quickly and easily.

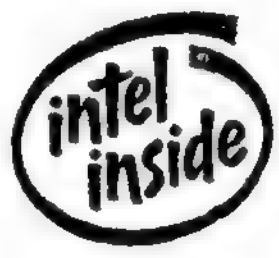
PC MAGAZINE EDITORS' CHOICE

The two other products that we evaluated have unique advantages. The tools included in the inexpensive Microsoft Windows NT Resource Kit provide just about everything needed to set up a Web server. The only thing that the Kit is missing is an SMTP server. The tools' smooth integration with Windows NT is an advantage. The Digital Road Map for Windows NT CD-ROM is packed with useful utilities, not only for building a Web server but for optimizing Windows NT itself. It's a good one-stop tools-and-information resource. Even the on-line documentation is designed and implemented well.

[illegible]

How does this humble arthropod have the power to carry an object 50 times its own body weight?

It's like the Liberty small notebook from Gateway 2000.® It may be small in size, but it packs a powerful punch that squishes the competition!



256K L2 Cache, 14.4 fax/modem, IR abilities and MS Office Professional for $4,499]

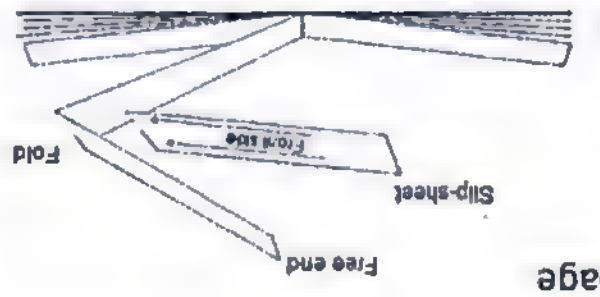
800-846-4320

Folded edge of the page

GbsSlipSheet-001

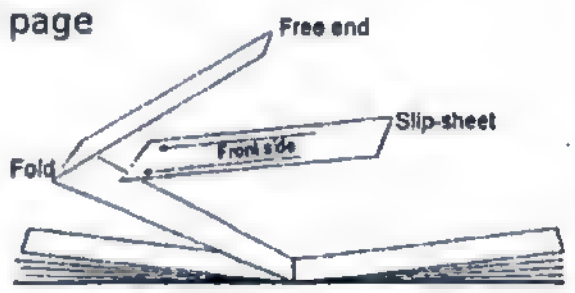
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Inverted Back

1. Follow instructions on the other side

Back

1. Follow instructions on the other side

Copyrighted material

The 4.2-pound Liberty™ DX4-100 Best Buy features an impressive 10.4" screen, 720MB HD, 24MB RAM,

**Compaq® Elite™ and Toshiba™ Portege™ configuration, pricing and Ziff Davis' Winstone 95™ version 1.0 overall score are from January 24, 1995, PC Magazine. **Dell Latitude™ configuration and pricing are from March 1995, Windows Sources. Latitude Winstone 95 overall score is from January 24, 1995, PC Magazine. Compaq, Toshiba and Dell PCs use TFT displays. The Winstone 95 overall score for the Gateway 2000 Liberty DX4-100 Best Buy was achieved using a 100MHz Intel® 486DX4, 24MB, 256K L2 cache, 720MB HDD, local bus IDE, 64k disk cache, C&T 65545 1MB DRAM with C&T driver 3.11, MS-DOS 6.22 and Microsoft® Windows™ 3.11, SMARTDRV 2MB cache, and 640 x 480 pixels 256 colors. All products used in the test were shipping versions. The test was performed without independent verification by Ziff-Davis.*

[!]

Gateway 2000's portable PCs — the Liberty and ColorBook².

GATEWAY 2000® LIBERTY™

- 4.2 Lbs., 10" x 8" x 1.6"
- 10.4" DSTN Color Display
- 1MB Video RAM
- Choice of Desktop IR Receptor or External Floppy Drive
- Intel® 486 DX2 or DX4 Processor
- Instant On
- NiMH Battery & AC Pack
- 2 PCMCIA Type II Slots
- EZ Point™ Integrated Pointer
- Removable Hard Drive
- 78-Key Keyboard
- Parallel, Serial, VGA & PS/2® Ports
- Portable Specific Software
- MS-DOS® 6.22 & WFW 3.11
- Microsoft® Works for Windows™ 3.0 or MS Office Professional 4.3**

LIBERTY DX2-50

10.4" DSTN Color Display, 8MB RAM, 340MB HD, MS Office Professional 4.3

$2799

LIBERTY DX4-100

10.4" DSTN Color Display, 8MB RAM, 540MB HD, 256K L2 Cache, MS Works

$3299

LIBERTY DX4-100 Best Buy *48-Hour QuickShip**

10.4" DSTN Color Display, 24MB RAM, 720MB HD, 256K L2 Cache, TelePath™ 14.4 XJACK® Fax/Modem, Extra Battery, Leather Carrying Case, Desktop IR Receptor, External Floppy Drive, MS Office Professional 4.3**

$4499

COLORBOOK²™

- 5.7 Lbs., 11.65" x 8.5" x 1.77"
- 10.3" DSTN Color Display
- Intel 486 DX2 or DX4 Processor
- 8MB RAM (expandable to 24MB)
- 1.5MB Video RAM (includes 512KB cache)
- Removable Hard Drive
- 3.5" Diskette Drive
- Integrated 16-Bit Sound and Speaker
- NiMH Battery & AC Pack
- EZ Point Integrated Pointer
- 2 PCMCIA Type II Slots
- 85-Key Keyboard
- Parallel, Serial, VGA & PS/2 Ports
- Padded Carrying Case
- MS-DOS 6.22 & WFW 3.11
- MS Works for Windows 3.0 or MS Office Professional 4.3**

COLORBOOK² DX2-50

8MB RAM, 540MB HD, Carrying Case, MS Works 3.0

$2999

COLORBOOK² DX4-100

8MB RAM, 540MB HD, Carrying Case, MS Works 3.0

$3299

COLORBOOK² DX4-100 Best Buy

16MB RAM, 720MB HD, TelePath 14.4 Fax/Modem, Carrying Case, MS Office Professional 4.3**

$3999

Call for details on our portable PC options!

LIBERTY PROFESSIONAL PACK

MS Office Professional 4.3, PCMCIA TelePath XJACK 14.4 Fax/Modem, Extra NiMH Battery, Leather Carrying Case

$449

**48-Hour QuickShip program applies only to the Liberty DX4-100 Best Buy configuration. Your PC willl be delivered within two businesss days from the time of order. No additions or deletions can be made to the configuration. Available for approved credit card orders only while quantities last. Domestic U.S. orders only. Call us for details about other QuickShip offers.*

***MS Office Professional 4.3 includes Word, Excel, PowerPoint® presentation graphics program, and Access® database.*

SERVICE AND WARRANTY

- Lifetime portable-specific toll-free service and support
- One-year limited parts warranty
- 30-day money-back guarantee
- Special VIP warranty. We'll ship a replacement to you within 24 hours during warranty. Only available at the time of purchase for an additional $100.

PAYMENT OPTIONS

- Gateway accepts most major credit cards and C.O.D. terms
- Net 30-day terms and leasing options available to qualified commercial customers
- You can also apply for the Gateway 2000 DuoLine™ MasterCard® card, issued by Dial National Bank, Des Moines, Iowa.

Toll free from Canada
800-846-3609

Toll free from Puerto Rico
800-846-3613

GATEWAY2000

"You've got a friend in the business."®

8 0 0 - 8 4 6 - 4 3 2 0

intel inside

610 Gateway Drive • P.O. Box 2000 • N. Sioux City, SD 57049-2000 • Phone 605-232-2000 • TDD 800-846-1778 • Fax 605-232-2023 • FaxBack 800-846-4526
Component Add-On Sales 800-846-2080 • Sales Hours: 7am-10pm Weekdays, 9am-4pm Saturdays (CDT)

© 1995 Gateway 2000, Inc. Gateway 2000, black-and-white spot design, "G" logo and "You've got a friend in the business" slogan are registered trademarks, and ColorBook2, Liberty, EZ Point, and TelePath are trademarks of Gateway 2000, Inc. The Intel Inside Logo and Intel are trademarks or registered trademarks of Intel Corporation. All other brands and product names are trademarks or registered trademarks of their respective companies. All prices and configurations are subject to change without notice or obligation. Prices do not include shipping or applicable sales tax.

DRM also includes the European Microsoft Windows NT Academic Centre's (EMWAC) suite of Internet protocol servers. At first, you may not need all the features and power of HTTPS, the Windows NT server of choice, so you may want to use SerWeb.

Gustavo Estrella's SerWeb, Version 0.3, is a simple Microsoft Windows 3.1 HTTP server that was ported to Windows NT by EMWAC. Installing SerWeb is trivial; just copy the distribution files to your Windows NT directory, make changes to the SerWeb .INI file (which includes less than a dozen parameters), and run it as a desktop application. Without having to worry about server-setup issues, you're immediately able to focus on your HTML content. This is a great beginners' server.

Unfortunately, quick setup also means limited functionality. SerWeb is not compliant with HTTP 1.0, which means you won't be able to use all the features of a Web server. You can't use clickable images or Common Gateway Interface (CGI) 1.1 scripts, for example, and there aren't any security options other than the ability to restrict access to only one directory tree in your hard disk.

SUITABILITY TO TASK

Digital Road Map for Windows NT

	Power	Ease
Setup and configuration	GOOD	GOOD
Server management	GOOD	GOOD
Extensibility	GOOD	FAIR

SerWeb does provide a status window. If enabled, it gives you complete information on the operation of your HTTP server, but it can slow overall server performance and is only available when the server is up and running. This information can't be exported to a file, however, so you can't use it to get server-utilization statistics.

Although SerWeb doesn't have the direct support for searches that HTTPS offers, you can still use SerWeb in combination with the EMWAC Gopher and WAIS servers to build searchable content. Because *wais://* and *gopher://* are valid URL types, you can serve HTML documents with SerWeb that make explicit connections to the WAIS and Gopher servers. This isn't as efficient as using a server that offers direct support for search engines, but it may be perfectly suited to your needs.

SerWeb definitely isn't the tool for building a commercial-grade Web server. If your content relies on forms, clickable images, and CGI scripts, you should save yourself time and use HTTPS. But if you're learning how to build a Web server and content, or if all you need is a quick-and-dirty way to serve simple HTML documents to the Web, SerWeb is your best choice.

As for the overall product, Digital has done an outstanding job assembling DRM. A quick search through the Internet will show you that Digital has selected the most commonly used (and the most useful) Windows NT utilities available for building Internet services.

► **Digital Road Map for Windows NT.** Digital Equipment Corp., *146 Main St., Maynard, MA 01754-2571; 800-344-4825, 508-493-5111; fax, 508-493-8780.*

Circle 456 on reader service card

Microsoft Corp.

Microsoft Windows NT Resource Kit

BY SEAN GONZÁLEZ

If you use the CD-ROM included in the Microsoft Windows NT Resource Kit (WRK) for Windows NT, Version 3.5 ($149.95), to set yourself up on the Internet, you'll get a great bonus—the European Microsoft Windows NT Academic Centre's (EMWAC) suite of Internet protocol servers. EMWAC's freeware suite includes the Gopher server, the Wide Area Information Service (WAIS) server, the WAIS toolkit, and HTTPS, the freeware HTTP server chosen for Windows NT (available from *ftp://emwac.ed.ac.uk/pub/https* and *ftp://sunsite.unc.edu/pub/packages/infosys-*

Suitability to Task: Web Servers

In this up-and-coming category, the three products we evaluated meet different levels of need. The EMWAC tools included in Microsoft Windows NT Resource Kit are mainstream and relatively basic, whereas NetPublisher is moving toward a full Web publishing and distribution solution. We used three primary criteria for evaluating the products regarding power and ease.

Setting up a Web server isn't easy, but it shouldn't have to be impossible. Many businesses that want to establish a presence on the Internet won't be able to afford specialists to get them started. Often a person already on staff will have to become a Web expert, learning the process from scratch. That's why **setup and configuration** is the first and most important task to take into consideration. We look at the complete process of getting a Web server up and running, the set of tools and utilities provided, the ease by which the server can be made to run, and the integration of the product with the operating system. We also look at the package's ability to explain or demonstrate fundamental concepts to the novice. We give extra credit to products providing tools such as HTML editors.

SUITABILITY TO TASK

Product Name

	Power	Ease
Setup and configuration	FAIR	FAIR
Server management	GOOD	GOOD
Extensibility	EXCELLENT	EXCELLENT

Though at this point in time Unix Web servers still have the upper hand when it comes to management, the new Windows NT–based products for establishing a Web presence are catching up quickly. In the **server management** task, we look at the specific tools provided to manage the Web server. We give good ratings to products that provide support for or include scripting languages. We also look at tools to monitor server performance, log statistics, and provide information about server-usage profiles. All of these tools are important, because they can give you an idea of how well your Web page is doing. The ability to handle file and directory maintenance easily and graphically is another plus.

The Internet, with an estimated 20 million users worldwide, is a big place, and your Web server should be equipped to reach out to the farthest corners of the on-line world. In the **extensibility** task, we look at the Web server's features that allow it to be used outside the context of a simple hypertext-document server. Those features include protocol support and extensions that let you add features through other products. We also look for the level of compliance to the HTTP standard and for security features such as authentication. Security features are becoming a bigger and bigger issue as businesses try to sell products and services over the Internet.

Is Unix a Better Place to Be?

By Sean González

On the nuts-and-bolts level where servers work their communications magic, Unix and the Internet have always been more or less synonymous. Suddenly, there's an interloper on the scene—Microsoft Windows NT 3.5—challenging Unix's dominance. Industry passions run high over which is better.

First, don't be misled by Windows NT's current version number, 3.5: It's actually a new operating system, and certainly not as mature as any of Unix's several flavors. Unix has been evolving for more than 20 years, but Windows NT is essentially untested under real-world conditions. As Windows NT does get used under stress conditions, bugs are sure to emerge. But Unix is conceptually a 20-year-old operating system built by committee. Windows NT, by contrast, was built by a dedicated group of technologist-experts to offer big advances in features and manageablity.

WHAT'S UNIX GOT

When it comes to the selection of available HTTP-server software packages, Unix beats Windows NT hands down. There are more than a dozen commonly used Unix HTTP servers on the market, but we found only three for Windows NT, and only one of these is commercially available.

Greater variety isn't Unix's only strong selling point, however. Unix-based HTTP-server packages still need to incorporate more secure transaction-processing and access-control options. But some already offer security features, such as data encryption and server authentication, not currently available on Windows NT.

There are some great HTTP-server products in the Unix world. In particular, CERN's HTTP server, created by Ari Luotonen, has impressive security features and caching capabilities that enhance performance. And people can't stop talking about Netscape's Unix-based HTTP server, which offers features unparalleled by any other HTTP server: data encryption, server authentication, and the emerging Secure Sockets Layer (SSL) protocol.

Among the leading Unix servers—all of which have e-mail, FTP, Gopher, and World-Wide Web servers (but not full-text WAIS servers)—are BSBI's Internet Server (800-800-4273, 719-593-9445), The Santa Cruz Operation's SCO Global Access (800-726-8649, 408-425-7222), and Morse Telecommunications' Slackware Professional Linux 2.1 (800-606-6773, 516-889-8500).

UNIX WEB SERVERS HAVE THESE ADVANTAGES:

- *They've been around for years.*
- *The source code is available.*
- *You can find lots of free support.*
- *Source-code bug fixes are posted quickly.*
- *You get transaction-logging features.*
- *Server authentication is built in.*
- *Data encryption is available.*
- *They offer more simultaneous connections.*

YOU'VE COME A LONG WAY

Despite being relatively young, Windows NT has come a long way in a very short time. We found four companies (Beame & Whiteside, NCSA, Netscape, and Quadralay) hard at work building Windows NT versions of their Unix-based HTTP servers. Some of these will offer the same security and functionality features currently available on the Unix versions. So although Unix has better variety today, Windows NT–based Web servers will soon offer all the features you want.

The fact that Windows NT is still relatively young is a mixed blessing in many ways. Hackers haven't had the time, or perhaps the interest, to exploit its vulnerabilities, so using Windows NT may result in fewer security problems—to say nothing of less management overhead—than running a Unix Web server.

Running a reasonably secure Unix Web server today means a major investment in terms of research and management overhead. If you don't have staffers with Unix experience, you'll have to hire some or undergo a painful, lengthy learning process to build a secure Unix environment.

Windows NT is pretty secure right out of the box—more so than Unix, actually. And with the aid of the many available books on Windows NT, you should be able to set up a reasonably secure Web server using Windows NT with less effort than usingUnix.

Security isn't the only issue to consider, however, when choosing between Unix and Windows NT. Windows NT–based Web server products are far easier to install and configure than Unix-based ones. Depending on the server you choose, you could be up and running in minutes using Windows NT. And Windows NT's graphical interface opens doors to new HTTP server management and monitoring features like NetPublisher's server monitor tool. This feature is badly needed in Unix-based Web servers.

DECIDING TODAY

If you need to set up a Web server today that provides secure transaction capabilities, you don't have a choice: You'll have to go with Unix. If you can wait a few months, however, these features should become available in the Windows NT environment. □

THE COMPAQ CONTURA COLOR AERO AT $1,599.

An External Floppy Drive Is Standard, Which Leaves You The Option Of Leaving It Behind.

CONTURA AERO FEATURES:

- ONLY 4.2 LBS
- 486SX/33 PROCESSOR
- 4MB RAM (EXPANDABLE TO 12MB)
- 170MB HARD DRIVE
- 3.5" EXTERNAL DISKETTE DRIVE
- PCMCIA TYPE II SLOT
- 7.8" COLOR BACKLIT STN VGA DISPLAY
- INTEGRATED COMPAQ EASYPOINT™ TRACKBALL
- NIMH BATTERY PACK AND AC ADAPTER
- WINLINK FILE TRANSFER UTILITY WITH CABLE
- PREINSTALLED MS-DOS®, MS WINDOWS,® TABWORKS,® & LOTUS ORGANIZER
- 3-YEAR PICK-UP WARRANTY†

The Compaq® Contura® Aero™ is everything a great 486 ultra-portable notebook should be. First of all, it's quite small. Only 10.25" wide, 7.5" deep, and 1.7" high. It's also very light, a mere 4.2 lbs.

But most importantly, the Contura Aero is an incredibly full-featured and useful working tool. It comes with 4MB RAM, a color backlit STN VGA display, an external diskette drive, integrated trackball, preinstalled software and more.

For added flexibility, consider the Contura Aero Option Paq™ with an additional battery pack, a PCMCIA fax modem, and your choice of a carrying case or backpack.

At last. A Compaq quality ultra-portable notebook with a price proportional to its size.

CONTURA AERO OPTION PAQ

COMPAQ 192 PCMCIA FAX MODEM

ENHANCED NIMH BATTERY PACK

BACKPACK OR CARRYING CASE

ADD $279*

CONTURA AERO UPGRADES & OPTIONS

ADDITIONAL 4MB RAM (8MB TOTAL) *ADD $195*

CONVENIENCE BASE *ADD $99*

CANON BJ-10SX BUBBLE JET PRINTER *ADD $269*

COMPAQ DirectPlus

1-800-888-6052

WEEKDAYS 7-7, SAT. 9-3 CST

ASK FOR OUR NEW FREE CATALOG.

*Price good only with purchase of Contura Aero purchased through Compaq DirectPlus. †Restrictions and exclusions apply. Compaq Aero is covered by a Three-Year Pick-Up Warranty. Monitors, battery packs and certain options are covered by a One-Year Warranty. © 1995 Compaq Computer Corporation. All rights reserved. Compaq and the Compaq Logo Registered U.S. Patent and Trademark Office. DirectPlus is a registered service mark of Compaq Computer Corporation. Contura is a registered trademark, Aero and EasyPoint are trademarks and Option Paq is a service mark of Compaq Computer Corporation. Products, prices and programs are subject to change without notice. Other products are trademarks or registered trademarks of their respective companies. Microsoft, MS-DOS and Windows are registered trademarks of Microsoft Corporation. TabWorks is a registered trademark of Xerox Corporation. Offer available in the U.S. only

tems/www/servers/https).

Together with Windows NT 3.5's FTP and Domain Name Service (DNS), the WRK gives you almost everything you need to set up a complete World-Wide Web server. (The one missing thing is an SMTP server to handle e-mail.) The WRK also includes Windows NT performance tools and Portable Operating System Interface for Unix (POSIX), all of which are useful for monitoring your server-growth trends and needs.

SERVING INFORMATION WITH HTTPS

Like the other EMWAC servers and WRK utilities, HTTPS, Version 0.94, is copied to your hard disk by an easy-to-use graphical setup program. Installation, however, consists of nine manual configuration steps. Fortunately, the instructions are easy to follow.

Once we had the HTTPS applet installed, we ran it from the Windows NT Control Panel to define the root directory where our HTML content resided, enabled logging, and defined the logging directory. The only problem that we ran into was that the HTTPS applet doesn't automatically create the data directory, which is where HTML content is stored, or logging directories. You have to remember to create both types of directories beforehand.

HTTPS does give you the ability to control directory browsing. Even when browsing is enabled, you can disable it on a per-directory basis by creating a NOBROWSE file in the directory you want to protect. Although this is not a security feature per se, you can use it to control which directories Web users can view.

After copying the content from an existing Unix Web server to our test system, we were able to access most of it immediately. HTTPS behaves much like traditional Unix-based HTTP daemons, except that it's much easier to set up.

HTTPS conforms to the HTTP 1.0 protocol specification. Though not the latest version available, 1.0 is commonly used and should provide you with most of the Web server functions you need.

The Common Gateway Interface (CGI) 1.1 scripting standard is supported, but the target script must be an executable Windows NT program with an .EXE extension. This means that some programming is necessary to use scripts. Instead of creating executable programs, you can use an interpreted scripting language, such as Perl. The server manual gives you examples of how to do both.

If you want to include WAIS-searchable content in your Web pages, the WRK manual thoroughly explains how to use the WAIS toolkit and the HTTP server. Once installed, they're easy to use and make integrating WAIS-searching capabilities into your Web content simple and hassle-free.

Clickable images are also supported. If you're already familiar with the European Laboratory for Particle Physics (CERN)

SUITABILITY TO TASK

Microsoft Windows NT Resource Kit

	Power	Ease
Setup and configuration	GOOD	GOOD
Server management	GOOD	GOOD
Extensibility	GOOD	FAIR

image-map format, you'll have no problems building clickable images with HTTPS. (We copied clickable images from a CERN server and were able to use them without any modifications.)

WHO'S BEEN ACCESSING MY SERVER?

If you want to track what's been accessed on your server and who's been doing the accessing, you can enable a transaction log. This file is kept open for performance reasons until it's closed to create a new day's log, and you can't look at the current log contents while HTTPS is running.

The log contains a time stamp; the IP address of the server and the client; the HTTP request, including the URL requested; and the version of the HTTP protocol used. This format is referred to as transaction logging, and several Unix HTTP daemons, including the CERN and National Center for Supercomputing Applications (NCSA) servers, have the capabilities to create these log files. If you're used to building statistics by top-level Internet domain names, you'll be annoyed by HTTPS's lack of DNS translations of client IP addresses. We hope this feature will be added in a future release of HTTPS.

Errors and warnings are logged using the Windows NT Application Event Log. Events that indicate problems with HTTPS are flagged as errors; events that indicate problems experienced with or by clients (such as incorrect URL requests) are flagged as warnings.

Besides the ability to restrict directory browsing, HTTPS doesn't really offer any security features. So if you need to build a commercial-grade service, this server may not meet your security needs.

We didn't subject the HTTPS to a serious stress test, but no obvious performance bottlenecks surfaced. The server handled our 1,000-item test list without any delays or problems.

If you're a Unix HTTP server manager and need or want to migrate to the Windows NT environment or if you want to set up a server with the same power and functionality of most Unix servers but want a product that's both easier to set up and use, using the Internet tools in the Microsoft

Microsoft Windows NT Resource Kit includes World-Wide Web tools that demonstrate the ease-of-use advantages Windows NT has over Unix.

You already know where you want to go, and we can help you get there. With Business Source. Call our software information resource and we'll send you our *Making the Move* kit. It contains our step-by-step guide and an implementation software program. On it you'll find a clever Wizard that creates a detailed map of your move tailored to your specific

AND WE'LL SEND DIRECTIONS.

software as well as hardware. Which means you can avoid rocky starts and productivity roadblocks. For those of you who are in the early stages of moving, ask for our *Planning The Move* kit to answer your software questions. These are only a few of the ways we've made moving from DOS to Windows™ applications easier than ever. The next move is yours.

business SOURCE

[1-800-60-SOURCE]

Microsoft
WHERE DO YOU WANT TO GO TODAY?™

Will Your Business Be Safe?

By Kevin Reichard

When it comes to security on the Internet, remember two things: There's no such thing as absolute security, and there are plenty of clever people out there who consider it great sport to try to skirt any security measure you take. What that means is that the better your security, the greater the challenge to them.

BUILDING FIREWALLS

The most popular method of preventing unauthorized access to your data is to construct what's known as a *firewall* between your data and the Internet. A firewall is software that sits between your data repository and the Internet, filtering the packets that are generated by the Internet's baseline protocol, TCP/IP, which wasn't built for security.

You can configure a firewall to allow access only from specific hosts and networks, or you can set it up to prevent access from specific hosts. In addition, you can give different levels of access to various hosts; a preferred host may have full access, whereas a secondary host may have access to only certain portions of your host's directory structure. (This is how anonymous FTP happens on larger systems; these users have access to only specific directories.)

ASSURED PIPELINES

For a higher level of security, you can have an *assured pipeline*, which uses more sophisticated methods to prevent access. A firewall looks only at the header of a packet, but an assured pipeline looks at the entire request for data and then determines whether or not the request is valid. Inappropriate requests can be routed away from the Internet, whereas files that meet specific criteria (such as those that contain the word *confidential*) can never be sent over the Internet—it doesn't matter if the request is made by someone who is logged on as the system administrator or as a root user. You pay for this kind of security, though. Sidewinder, from Secure Computing Corp. (800-692-5625), carries a minimum price tag of $30,000.

PRODUCTS TO USE

If you plan on making sensitive data available on the World-Wide Web, consider one of the many secure Web products currently hitting the market. To one extent or another, you'll be using technology from RSA Data Security, which is used both in Netscape Communications Corp.'s Netsite Commerce Server and Terisa Systems' SecureWeb Toolkits. Although they differ somewhat in the execution, these products work on the same premise; both encrypt data that moves between a Web site and a Web browser.

You can set up a firewall to allow access only from specific hosts and networks; you can also set one up to prevent access from specific hosts.

Terisa Systems accomplishes this through Secure HTTP, which performs the actual encryption and decryption at both ends of a transmission on a specific Web document. The Netsite Commerce Server, a Unix-based server, uses Netscape's Secure Sockets Layer (SSL) protocol (working in conjunction with TCP/IP) to transport sensitive data via secure ports on the server.

In both cases, you're working with specialized Web browsers. Spyglass's Enhanced Mosaic 2.0 and its many derivatives (SPRY's AIR Mosaic, Verity's Verity Mosaic) support Secure HTTP; Netscape Navigator works with SSL. Because the technology isn't mutually exclusive, you can implement both methods for added security. (Terisa can be reached at *info@terisa.com*, and Netscape's e-mail address is *info@mcom.com*.)

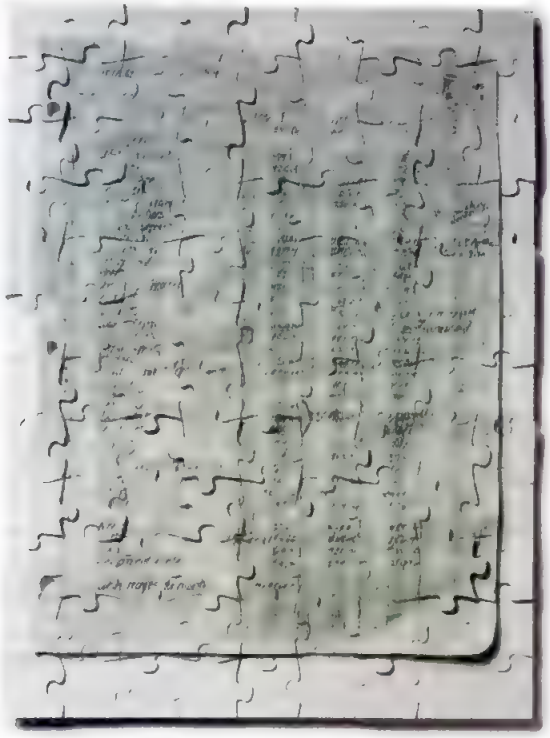
ENCRYPTING E-MAIL

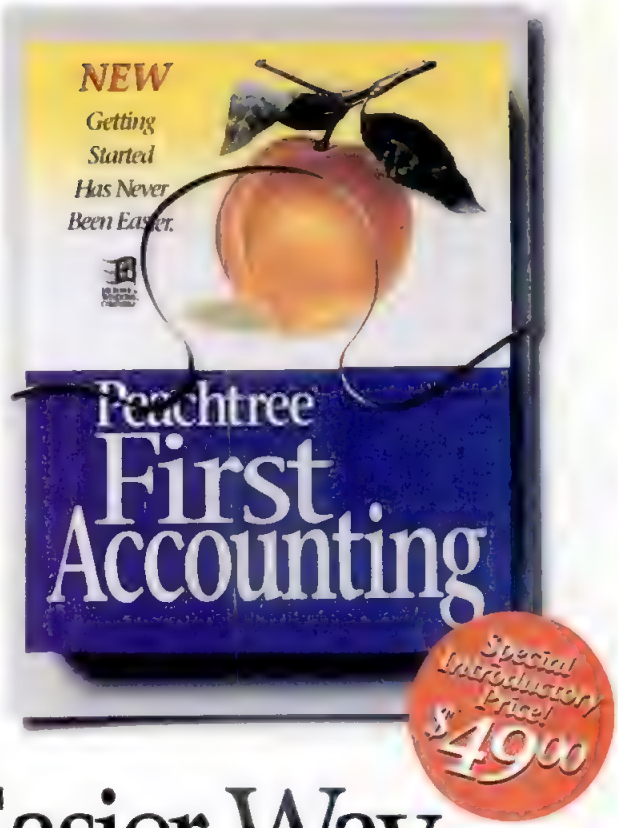
You can protect sensitive e-mail by encrypting either the mail itself or the files attached to it. Perhaps the most famous encryption tool on the Internet is Phil Zimmermann's Pretty Good Privacy (PGP), which uses public-key technology to encrypt messages.

PGP combines public and secret keys from two users to encrypt a file or part of a mail message; you must have the public key of the recipient of an encrypted file for them to decrypt the file. A similar alternative is the MIT Kerberos authentication scheme, which you can use to secure specific messages or to protect the server's protocol level.

Information about PGP can be found at *http://www.mantis.co.uk/pgp/pgp.html*. You can grab PGP 2.62c from *net-dist.mit.edu*, either via FTP or telnet (pgp262.zip, in the */pub/PGP* directory, which also contains documentation and licensing agreements). Be warned that PGP 2.62c can't be used with older versions of PGP.

There is a Usenet newsgroup devoted to PGP, *alt.security.pgp*. It is an essential resource for any administrator dealing with security, as are the newsgroups *comp.risks*, *alt.security*, *alt.security.index*, and *comp.security.announce*. Security FAQs can be found at *rtfm.mit.edu* in the */pub/usenet-by-group/comp.answers/computer-security* directory. □





There's An Easier Way To Do Your Accounting.

It's one thing to use your PC for memos and letters. And quite another to trust it with the lifeblood of your business – your accounting.

Maybe that's why so many business owners cling to pencil and paper, or try to get by with personal finance software.

Well, we're out to change all that. Starting today.

Designed For First Time Users.

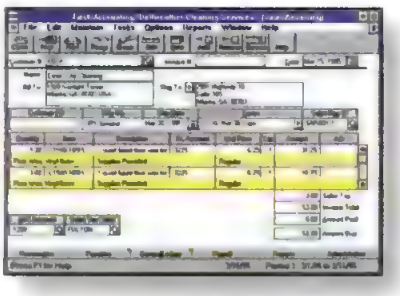
New Peachtree First Accounting was created to take the anxiety out of accounting for first time users.

Make no mistake. It's a powerful business accounting system. But it also offers special help features. Navigational Aids. SmartGuides that walk you through most common tasks. Online Help. And other features that make it the easiest way yet to computerize your accounting.

There's even an Automation Guide for people moving their books from paper to PC for the first time.

Do More In Less Time.

With First Accounting, you can invoice your customers, manage your receivables, pay your vendors and employees, and track job costs. And with more than 100 standard business reports to choose from, it's easy to keep track of how your business is doing.



Simply put, it handles your finances the way good business accounting software should – without any compromises. Yet it's as easy to use as a personal finance package. No kidding.

Just as importantly, it puts you on the right path: the Peachtree family of accounting products. So as your business grows, your accounting system can too.

Special Introductory Price: Only $49.

Peachtree First Accounting is priced so low, you can't afford not to try it. And we guarantee it to be the easiest accounting solution you've ever seen. If you don't think so, return it within 60 days for a prompt, courteous refund. Call now, and get up and running in no time.

(800) 428-9973

Peachtree®
An ADP Company

System Requirements: IBM Compatible 386 or higher, Windows 3.1 running in standard or enhanced mode, 4 MB RAM, 12 MB free hard disk space, VGA or higher monitor, mouse. Works with any Windows 3.1 compatible printer.

© Copyright 1995, Peachtree Software, Norcross, Georgia. • All products are trademarks of their respective companies.

CIRCLE 393 ON READER SERVICE CARD

Windows NT Resource Kit is the clear choice. Its consistent integration with the Windows NT environment and comprehensive set of features will give you all the functionality you need.

▶ **Microsoft Windows NT Resource Kit.** List price: *$149.95.* Microsoft Corp., *One Microsoft Way, Redmond, WA 98052-6399; 800-426-9400, 206-882-8080; fax, 206-936-7329.*

Circle 457 on reader service card

Ameritech Library Services Inc.

NetPublisher

BY SEAN GONZÁLEZ

If you've been looking for a superior product to manage your World-Wide Web content, Ameritech Library Services' NetPublisher, Version 1.0, is second to none. Experienced Web content managers will find this product confusing at first, but the end results are well worth the effort.

The product consists of a single server that supports the HTTP, Z39.50, and Gopher search protocols. Installation is easy.

SUITABILITY TO TASK

NetPublisher

	Power	Ease
Setup and configuration	EXCELLENT	EXCELLENT
Server management	GOOD	GOOD
Extensibility	EXCELLENT	GOOD

If you've managed content on the Web before, you'll be surprised by NetPublisher's approach. Think of this program as one that offers access to Gopher-like (hierarchically structured) content through HTTP rather than through a traditional HTTP server. Your content must be structured with the NetPublisher editor before it can be accessed through the Web. This structure will help you organize your content as no other product can, but it takes some getting used to. Fortunately, the NetPublisher editor is packed with impressive content management features that are easy to use and powerful, if not always intuitive. The included tutorials and documentation should help you figure things out quickly.

FROM THE TOP DOWN

Your server content is referred to as a "publication." Starting from the server's top-level menu item, or root, you organize your content hierarchically off the root. Adding an item to this content tree is as simple as dragging the appropriate content-type icon from a palette to its position within the tree. Supported item types include directory map, file, foreign link, form, menu, and image map.

The menu item is used to build the tree structure, or the graphical view of your content; each menu level is displayed as an HTML page in your Web browser. File items are your content files. Foreign links are equivalent to what are commonly referred to as URLs and are used to establish a link to other services or servers.

Unlike other HTTP servers, where URLs can be used freely within your content, the foreign-link item is a leaf in the tree (a menu item off a Gopher menu), not an object within a file item. You can embed URLs in your HTML file items and refer them to your server content. The process to make them available is not as straightforward as it could be, but Ameritech expects to remedy this in the future.

The form item gathers input from the user. Both Common Gateway Interface (CGI) 1.1 and DLL programs are supported, so information obtained from forms can be processed. Because the program includes a DLL, you can use this without doing any programming. The directory item enables remote access to directories in your server's hard disk.

MAPPING OUT YOUR PAGE

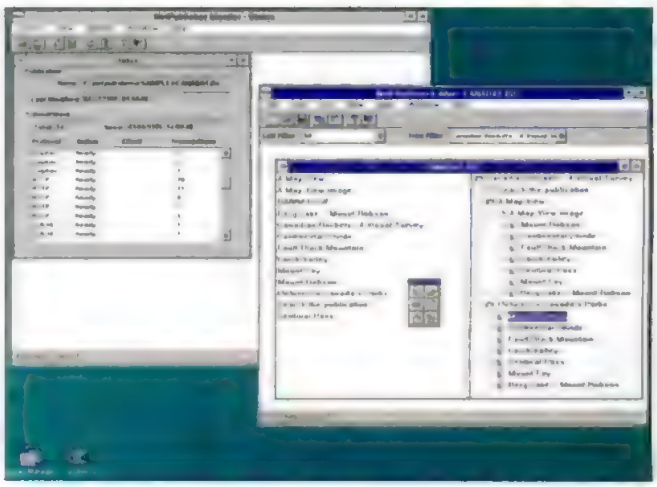
One of NetPublisher's best tools is the image map used to build clickable graphics, in which a click on a region—or hot spot—of the graphic links you to other pages. To create an image map, you just edit the graphic with the image-map tool, graphically select the area you want to make a hot spot, and set preferences.

Each item you add to your content has definable preferences that include item and catalog information. The item information includes the pathname to the actual disk file with your content, check boxes to indicate whether content is searchable, templates for forms, and other items that define the look and feel of your pages. Catalog information defines fields for Z39.50 and Gopher/Jughead searches.

With NetPublisher's HTML Template Wizard, you can create individual or default HTML page templates. By answering a few questions, you define the header, body, and footer layout of your pages. Note that in the body section only lists can be included, which is consistent with the hierarchical nature of NetPublisher content. The template automatically includes time stamps, as well as author, contact, and other administrative information to keep you and your clients aware of your content characteristics without requiring you to provide this information manually.

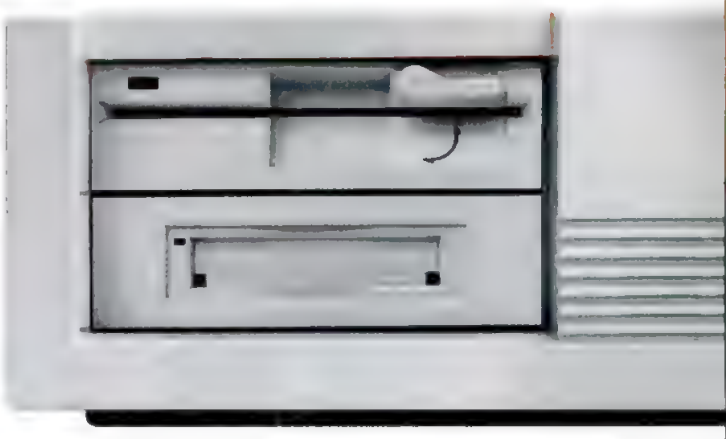
During installation, you determine how many simultaneous Gopher, HTTP, and Z39.50 clients requested will be processed by the server simultaneously. (The default for each is five.) Using the monitor tool, you can start, stop, and monitor your server with a single interface. While the server is running you get real-time statistics on how many connections each of the three server processes has serviced.

The monitor also supports full transaction logging. You can export the logs to ASCII files, which can be used with a spreadsheet program to manipulate the data to meet your needs. Remote client addresses are stored in IP format in the log file. The program doesn't automatically create new log files and close old ones, so



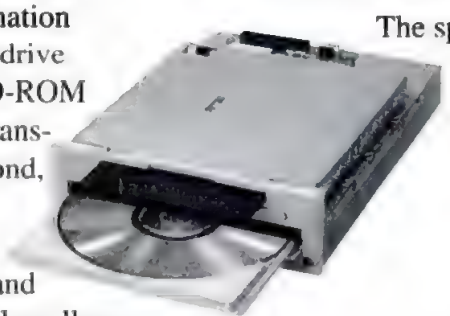
NetPublisher is a suite of World-Wide Web server tools that includes a monitor (left) and an editor (right) in which you must structure data.

NO VACANCY



When you're out of room and need a CD-ROM drive, try our new SuperQuad™ 4X CD-ROM & 3.5" floppy drive combo!

Everybody wants the speed of 4X CD-ROM for multimedia and games. Now, even if all your bays are full, there's a solution. Our two-in-one SuperQuad™ Combo — a combination of our world famous 3.5" floppy drive and our new SuperQuad™ 4X CD-ROM drive. The 4X CD-ROM drive transfers data at a blazing 600KB/second, is Sound Blaster™ compatible, and has a lightning fast 195 ms access time. It's also both DOS and Windows™ compatible and will play all your CD-ROM titles whether they're 2X, 3X or 4X!



The SuperQuad™ Combo kit comes complete with everything you need! So you don't need a SCSI port, a larger case, or a PC consultant.

The space-saving SuperQuad™ 4X CD-ROM & 3.5" Floppy Combo drive is making "room available" nationwide. Call 1-800-888-4XCD for the retailer nearest you.

TEAC

TEAC America, Inc., 7733 Telegraph Rd., Montebello, California 90640
213-726-0303 Ext. 609

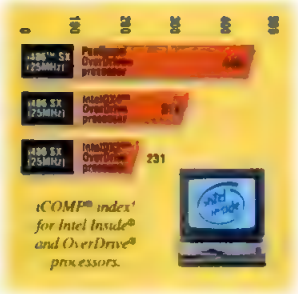
CIRCLE 184 ON READER SERVICE CARD

Available At COMPUTER CITY **Call 1-800-THE-CITY**

© 1993 Intel Corporation. †Source: ICOMP®: A Simplified Measure Of Relative Microprocessor Performance. Intel Corporation. 1992. ††The 63-MHz Pentium OverDrive processor for most 50-MHz and 25-MHz Intel486™ CPU–based systems is available now. The 83-MHz Pentium OverDrive processor for most 66-MHz and 33-MHz Intel486 CPU–based systems will be available later in the year. *Other trade names referenced are the property of their respective holders.

Run your PC faster with the Over

The OverDrive® processor is a single-chip CPU upgrade that maximizes the performance of most Intel486™ processor-based PCs.



OverDrive processors boost CPU performance as much as 343%, making your software run much faster.

The family of IntelDX2,™ IntelDX4,™ and newly released Pentium® OverDrive processors†† gives you several affordable upgrade options for your i486™ CPU-based PC—each of them fully software compatible.

Contact your PC reseller for more information about OverDrive processors, or dial the FaxBack® service at 1-800-525-3019, document #9306. Or call 1-800-538-3373, ext. 295.

Drive® processor upgrade.

intel®

you'll have to do this as needed.

Although user authentication isn't supported, you can restrict access to your server using IP-based authentication. No other security features are supported.

We did find a few minor problems, the biggest being performance. Using the drag-and-drop capabilities of NetPublisher's editor, we added 1,000 file items from the Microsoft Windows File Manager to our publication and then retrieved the item list from a Web browser. Serving the same amount of information using a traditional HTTP server took less than 10 seconds, but it took NetPublisher a minute to process the item list before transmitting it to our Web browser. The time it took to send the item-list data was comparable with the time taken by other HTTP servers.

NetPublisher's image-map tool, consistent use of drag-and-drop, ability to add Jughead searching, use of form templates, and HTML Template Wizard make it an outstanding Web content management tool. But its restrictive, hierarchical content layout limits its use to information that can be organized in that manner.

▶ **NetPublisher, Version 1.0.** List price: *$16,000 (library version); $8,000 (commercial version with HTTP and Gopher protocols only).* Ameritech Library Services Inc., Academic Division, *1007 Church St., Evanston, IL 60201; 800-556-6847, 708-866-1726; fax, 708-866-0178; e-mail,* info@notis.com.

Circle 458 on reader service card

Three Routes to a Web Presence

By Jill H. Ellsworth

Right behind the thousands of businesses already on the Internet are many thousands more dying to get on-line. While some are merely curious about cyberspace, others are committing major hardware, software, and personnel resources to establish a substantial presence on the Internet.

If you are interested in being wired for business, there are several approaches to getting on-line. Each can be tailored to the level of your interest and resources.

ROLL YOUR OWN

A low-budget, entry-level strategy involves creating your own World-Wide Web pages and posting them on the Web, in "space" acquired from a commercial access provider. You can learn the basics of writing Web pages (which are actually HTML documents). And with the advent of easy-to-use HTML document-creation tools, such as HoTMetaL Pro, Version 1.0, from SoftQuad (416-239-4801), and HTML-Assistant Pro, Version 1.5 , from Brooklyn North Software Works (902-835-2600), Web pages are easy to put together. (For more information, see "HTML: Nothing but Net," February 7, 1995; information is also available on the Internet at *http://info.cern.ch/hypertext/WWW/MarkUp/MarkUp.html.*)

Once your Web pages are up on the Internet, any and all Web surfers will be able to access your Web offerings. Such basic installations usually don't allow on-line customer-response forms, but people can respond via e-mail, fax, or phone.

Keep in mind that this approach requires a substantial time commitment. In addition, remember that the quality and look will depend entirely on *your* resources and talent for preparing HTML documents.

Simple, do-it-yourself World-Wide Web pages can be posted for as little as $20 to $40 per month.

ORDERING OUT

For many businesses, working with a commercial Web services provider is a good choice. Many providers will assist with all facets of design, marketing, and maintenance, and most let you offer on-line order forms. Increasingly, providers are offering technology for secure transactions as well.

Retailers may be interested in cybermalls, which are virtual storefronts that are maintained by some providers. Cybermalls usually have a common entry page and a uniform look and feel. Setting up at such a site is easy, and the cybermall's ability to attract customers can be valuable. You may not, however, have as much latitude to customize your site as you might like.

Alternatively, some businesses create their own pages—often with the assistance of a consultant or ad/marketing agency—then lease commercial Web space. This lets businesses maintain creative control while they leave technical details to technicians.

IN-HOUSE CATERING

Businesses with the resources to hire or train the necessary personnel can bring the whole Internet operation in-house. They can install a Web server on their own systems, set up an Internet node, and create their own multimedia documents from scratch.

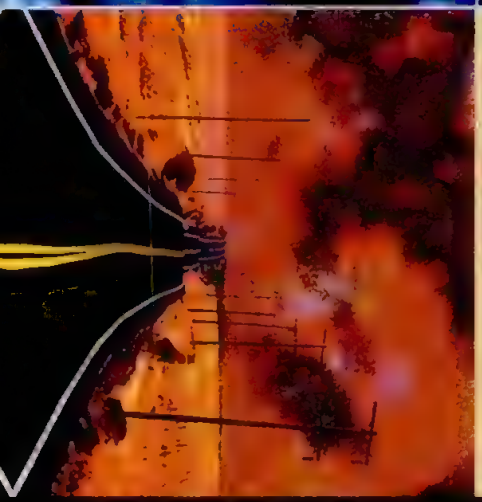
If businesses can afford it, this method provides the best control over access, design, and content. This option, however, is only cost-effective for a large business that has the Web experts or is willing to get them.

PAYING THE BILL

Costs are in flux in all these categories. For the simple do-it-yourself method, you can find sites in the $20-to-$40-per-month range. Web service providers usually offer an à-la-carte selection of services, with first-time setup charges ranging from $100 to $1,000 or more, and monthly charges that run anywhere from $25 to $10,000. The cost of a full in-house operation will reflect the number of people staffing the project.

Whichever route you pick, get on-line soon and start gaining experience. An Internet presence might just be the ticket to your success. □

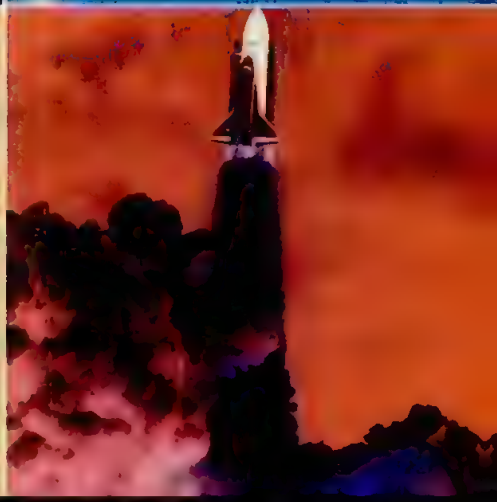
THE WORLD IS WAITING FOR YOU...



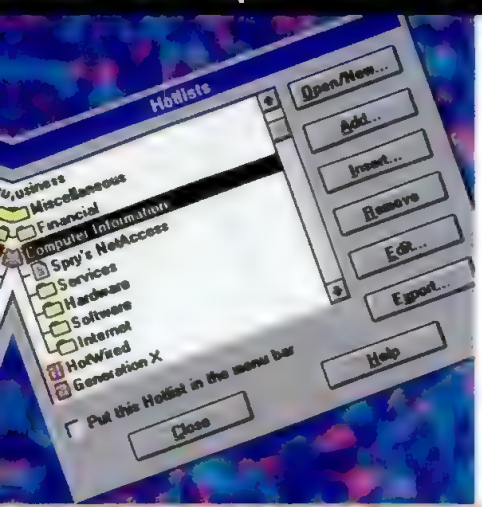
The Complete Internet Solution

INTERNET IN A BOX

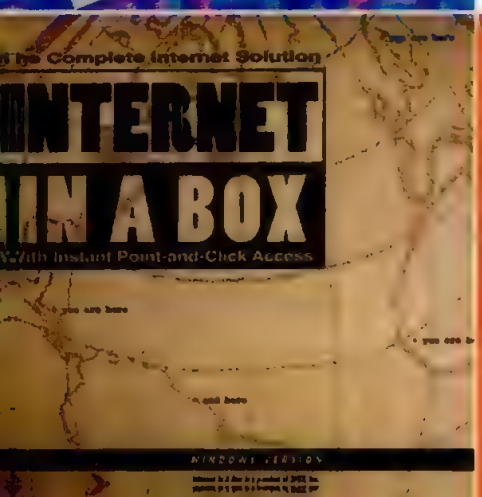
With Instant Point-and-Click Access



Mail • News • Gopher • Telnet • File Transfer • Multimedia • AIR Mosaic • Electronic Mail • News • Gopher • Telnet • I



Internet In A Box™ from SPRY, Inc. is the only Windows™ compatible software that combines the ease-of-use of an online service with the worldwide resources of the Internet. Start exploring the Internet in less than five minutes with a complete set of intuitive software. Internet In A Box makes it easy—you just point-and-click, and you're on your way to the Internet world.



NOW.

CIRCLE 028 ON READER SERVICE CARD

Contact your local software reseller today to buy your copy of Internet In A Box. What are you waiting for?

SPRY
INTERNETWORKING THE DESKTOP

MICROSOFT® WINDOWS™ COMPATIBLE

For more information, call:
1-800-557-9614 x40
E-Mail: iboxinfo40@spry.com
WWW Server: http://www.spry.com

It's good for your output.

It's good for your world.

Cartridges returned via:

ups® MBE® MAIL BOXES ETC.®

Call 1-800-962-2708 for Detail.

All registered trademarks belong to their respective holders.

CANON INC. 30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo 146, Japan. ©1995 Canon Inc.

The Canon Cartridge. In laser beam printers, personal copiers and plain paper fax machines, it's the heart of the desktop publishing revolution that's transformed homes and offices around the globe.

The key components of the imaging mechanism are combined with the toner in an all-in-one cartridge so simple to replace that anyone can do it. Replacing the cartridge ensures the highest output quality. It also makes your equipment virtually maintenance free. It's clean as well as simple, too; so there's no need to dirty your hands.

Please return your spent Canon cartridges.

For output quality and operating convenience, no other system comes close. And here's the point we'd like to emphasize — when the cartridge is returned to Canon, the environment is benefited because landfill waste is reduced.

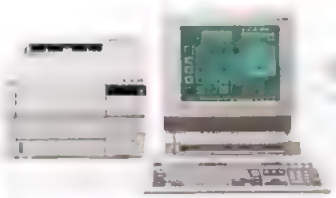
When returned to Canon, cartridges are carefully disassembled. Reusable parts are painstakingly screened and cleaned. Over 95 % by weight of collected cartridges' parts and materials are used in making cartridges or other products. The result: It's good for you. It's also good for the earth. Return your Canon cartridges when they are of no further use. Please.

As part of our Clean Earth Campaign in the United States, Canon makes donations to charitable organizations dedicated to environmental issues. Used cartridges are returned under the Clean Earth Campaign via the United Parcel Service (UPS) or Mail Boxes Etc. Shipping costs are paid by Canon, so there's no charge to our customers. Easy shipping instructions can be found in the cartridge box.

For your home or office, choose any of the wide range of products that use Canon cartridges.

Laser Beam Printer LBP-1260

Personal Copier PC320



Electronic Filing System Canofile 510

Fax Laser Class 5000

Canon

CIRCLE 258 ON READER SERVICE CARD

Lotus Ties Notes to the Internet

By Ben Gottesman and Amarendra Singh

Lotus Notes has emerged over the past several years as a leading tool for disseminating information within an organization, no matter how widespread the work force. Via public Notes servers such as the forthcoming AT&T Network Notes, CompuServe, and WorldCom, Notes databases could reach an even wider audience. Now Lotus is building a tool to distribute documents in those databases to the widest computer-connected audience of all: Internet users.

Lotus is creating a suite of products under the name "InterNotes" that should vastly improve the interoperability between Notes and the Internet. The first two components to appear are the $2,500 InterNotes News, which lets users participate in Usenet newsgroups from their Notes desktops, and the subject of this preview, the $7,500 InterNotes Web Publisher, Version 1.0—a tool that can automatically convert Notes databases (or portions thereof) into HTML documents for publication on the World-Wide Web.

EASY CONVERTS

The InterNotes Web Publisher consists of two primary parts: an administration database that controls which Notes databases will be converted to HTML and a Notes server add-in that actually performs the conversions. Lotus will also provide several sample applications to help customers get started. The first release of the Web Publisher, due sometime in the second quarter, will only run on Microsoft Windows NT–based Notes servers. Since the vast majority of today's Notes servers are OS/2-based, this may require early adopters to venture into unfamiliar territory. Lotus says it plans to release an OS/2 InterNotes Web Publisher after the release of the Windows NT product.

Notes presents data in Forms and Views. Forms show an individual database record, whereas Views provide a summary of some or all of the database. Like a Web document, a Notes Form can contain rich text and graphics. This similarity in data presentation is what makes Notes a suitable platform for Web publishing.

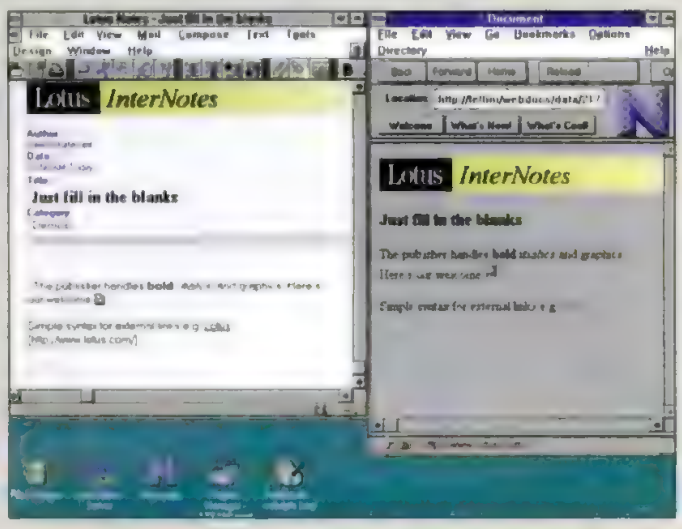
Most Notes users are familiar with a feature called DocLinks, which lets Notes users click on an icon to jump to another document within the same or a different database. The Web Publisher will automatically convert this icon and the link to an HTML hypertext link. In addition, users will be able to extend document presentation beyond Notes' native capabilities by embedding HTML commands—or entire HTML documents—within a Notes document. These commands can include links to documents on any Web server, not just those created by the Web Publisher. The program even does a nice job of converting Notes tables into HTML tables.

TOUGH CONVERTS

The first time a Notes database is run through the Web Publisher, all designated documents and views are converted into HTML. Thereafter, only new information and modifications are added. The conversion is extremely fast. The conversion of Notes Views isn't as smooth, however. Views are presented in a monospaced font, such as Courier. One of Notes' strengths is that users can wade quickly through vast amounts of data using categorized views and full-text indexing, but this first release of the InterNotes Web Publisher doesn't provide any searching capabilities or forms. To present data efficiently, organizations will have to create many views that show only a subset of the data. Another limitation of the Web Publisher is that all data is read-only. Lotus expects to address these shortcomings by the end of the year.

Given the limitations of the first version of Lotus's InterNotes Web Publisher, it's likely that the product will be used mostly to evaluate the feasibility of establishing a presence on the Web, including a look at demand and at maintenance costs. But if Lotus comes through on its update plans, the InterNotes Web Publisher should prove an extremely effective tool for creating and maintaining a business presence on the Web.

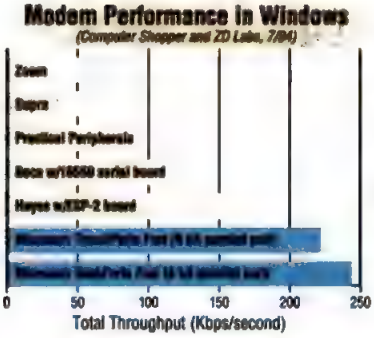
To see a site that's actually running off the beta version of the InterNotes Web Publisher, go to *http://www.lotus.com.* □



On the left is information as entered into Lotus Notes. On the right is the same page after it has been run through the Web Publisher and converted into HTML.

WHAT HAPPENS TO WINDOWS DATA WITH AN ORDINARY MODEM.

WHAT HAPPENS TO WINDOWS DATA WITH A MICROCOM MODEM.



The problem with ordinary modems is the serial port bottleneck. At high speeds, Windows data slams on the brakes as it tries to squeeze through your modem's ***serial port—which can only transfer data one bit at a time.*** Results: slower performance, frequent loss of data and higher phone charges.

A serial port accelerator card can help, but it can add $100 to the price and is difficult to install.

So Microcom got the bright idea of using the ***parallel port—which transfers data 8 bits at a time.*** And pioneered parallel port technology with a whole family of competitively-priced modems, including a high-speed PCMCIA card for notebook users.

As the ZD Labs chart clearly shows, this solution is a winner. In fact, the DeskPorte *FAST* 28.8 was "Experts' Pick" in the July '94 issue of *Windows Sources*. Both Microcom modems they tested achieved "...the highest overall throughput of any rival."

Like all our modems, they also include a standard serial port for ***DOS, OS/2 and UNIX*** as well as Windows communication.

For the Microcom reseller nearest you and a copy of the White Paper, *Parallel Port Interface: A Windows™ Communications Necessity,* call Microcom at

1-800-822-8224

Microcom's high-speed data/fax modems include the DeskPorte™, TravelCard™ and TravelPorte™ product lines.

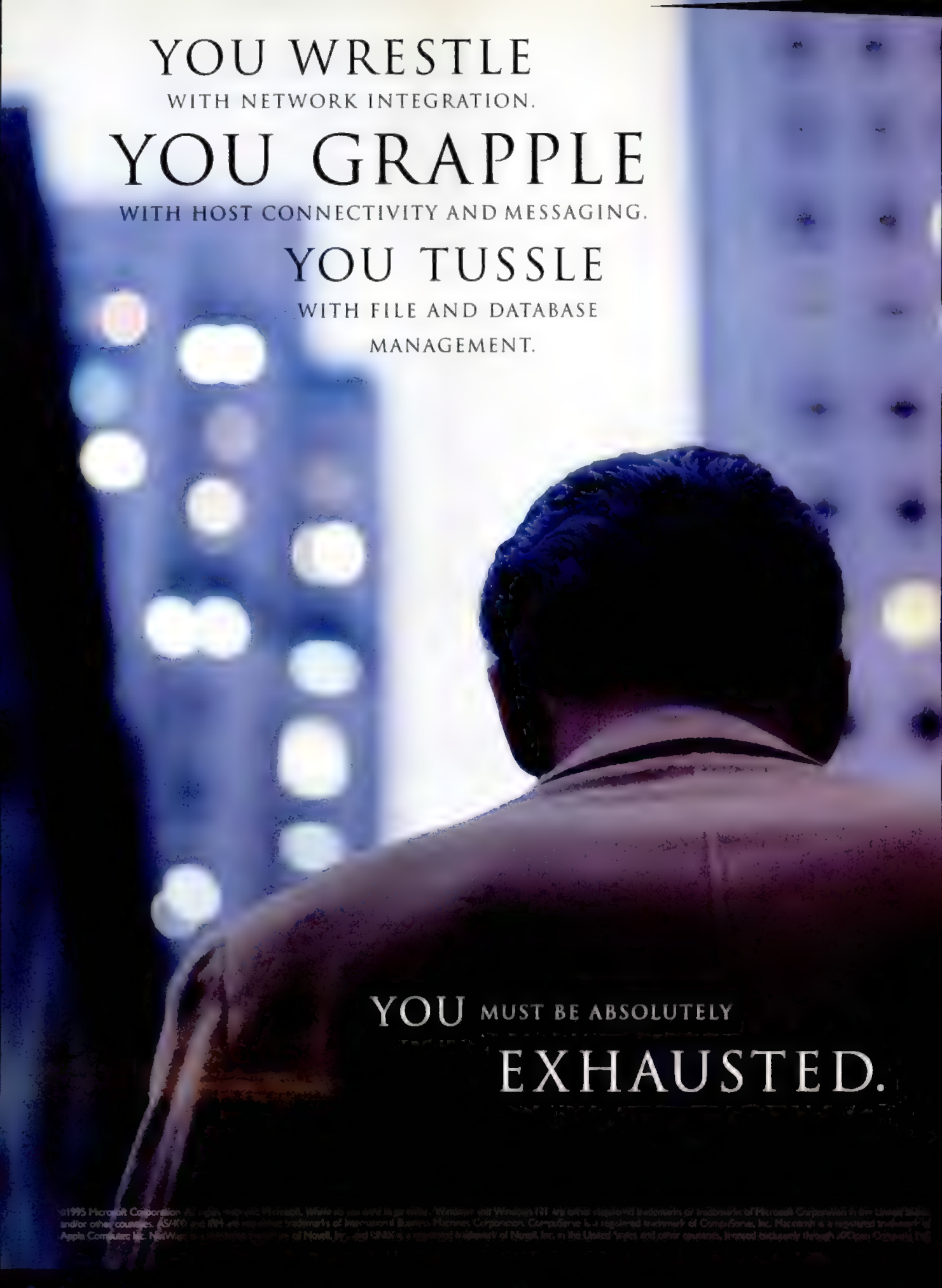
microcom®

The brightest ideas in remote access.

Microcom, Inc., USA (617) 551-1000 • Microcom U.K. Ltd., (44) 1 483-740763
Microcom E.M.A., France (33) 1 46 62 66 68 • Microcom Singapore Rep., (65) 348-6628
Microcom Australia, (61) 2 410-9953

© Microcom, Inc. 1994. All rights reserved.
Microcom is a registered trademark and DeskPorte, TravelPorte and TravelCard are trademarks of Microcom Systems, Inc.
All other trademarks are the property of their respective trademark holders.

CIRCLE 862 ON READER SERVICE CARD



©1995 Microsoft Corporation

Take heart. There's a new, integrated family of server software called Microsoft BackOffice. And it will empower you to do your job. With authority.

Imagine what you could do with an integrated information system.

You could finally break free of clumsy business systems. You could respond more quickly to changing business needs. You could enable the people you work with to get the information they need. So they can make better, smarter decisions.

It's called Microsoft® BackOffice. And it's a whole new approach to business computing. Five best-of-breed products that combine to form an integrated information system. One complete, seamless client-server network based on Windows NT™ architecture that will enable you to create the next generation of information applications. At last.

You start with the network operating system–Windows NT Server. After that, it's easy to add database management (Microsoft SQL Server™), messaging (Microsoft Mail Server), host connectivity (Microsoft SNA Server), and systems management (Microsoft Systems Management Server). You can forget struggling for days to get things up and running, because everything is optimized to work with Windows NT Server, and everything is designed to work together.

Microsoft Windows NT Server: *The network foundation for a new generation of business applications. It is a multipurpose network operating system that can deliver application server capabilities without compromising file and print service performance.*

Microsoft SQL Server: *The high-end database platform at the center of a complete client-server architecture for information management.*

Microsoft SNA Server: *Makes it easy to connect PCs to IBM mainframes and AS/400s.*

Microsoft Mail Server: *The heart of a complete messaging system that makes it easy to communicate with anyone, anywhere.*

Microsoft Systems Management Server: *The most comprehensive solution for managing networked PCs.*

Client License Pak: *BackOffice family licensing simplifies client-server pricing. The client license pak includes one Client Access License for each BackOffice server product you acquire, essentially licensing a single desktop to access those products on any server.*

You can forget struggling with a jumble of tools and incompatible interfaces, too. With Windows® architecture on both the client *and* the server, you'll use a consistent, graphical set of tools to develop and manage applications across all products. And easily tie corporate information to the desktop.

Now about money. And choice. Explain to your boss that an open platform means the power to extend your existing network, *including* NetWare,® Macintosh® and UNIX.® Mention that it runs on standard, leading hardware, which lowers the cost of purchase and operation. And that there are over one thousand 32-bit applications for the Windows operating system and tens of thousands of 16-bit Windows-based applications at your disposal. Which makes the BackOffice family a sound investment.

Call (800) 709-3783, Dept. HJM to learn more. Or contact us at "GO BIZSOLN" on CompuServe.® You can revolutionize the way people in your company use and share information. You can make the decisions that make your business run better. It's all within your reach.

Microsoft®

WHERE DO YOU WANT TO GO TODAY?™

Corel VENTURA™

POWER PUBLISHING!

5

VENTURA POWER *with* COREL EASE OF USE!

Corel VENTURA 5 offers the precision and power to take any document from conception to completion. With an intuitive new interface and powerful architecture that supports both structured and freeform documents, Corel VENTURA 5 can produce all your projects quickly, easily and accurately. New features include irregular text wrapping, incremental rotation of text and objects, OLE 2.0 in-place editing and advanced cross-referencing and indexing capabilities. Combined with the artistic power of Corel PHOTO-PAINT 5, Corel VENTURA 5 is the ideal tool for creating newsletters, catalogs, technical manuals, brochures and more.

Includes

COREL PHOTO-PAINT™ 5

The Best in Photo-Editing and Bitmap Creation

inmac

1-800-615-6173

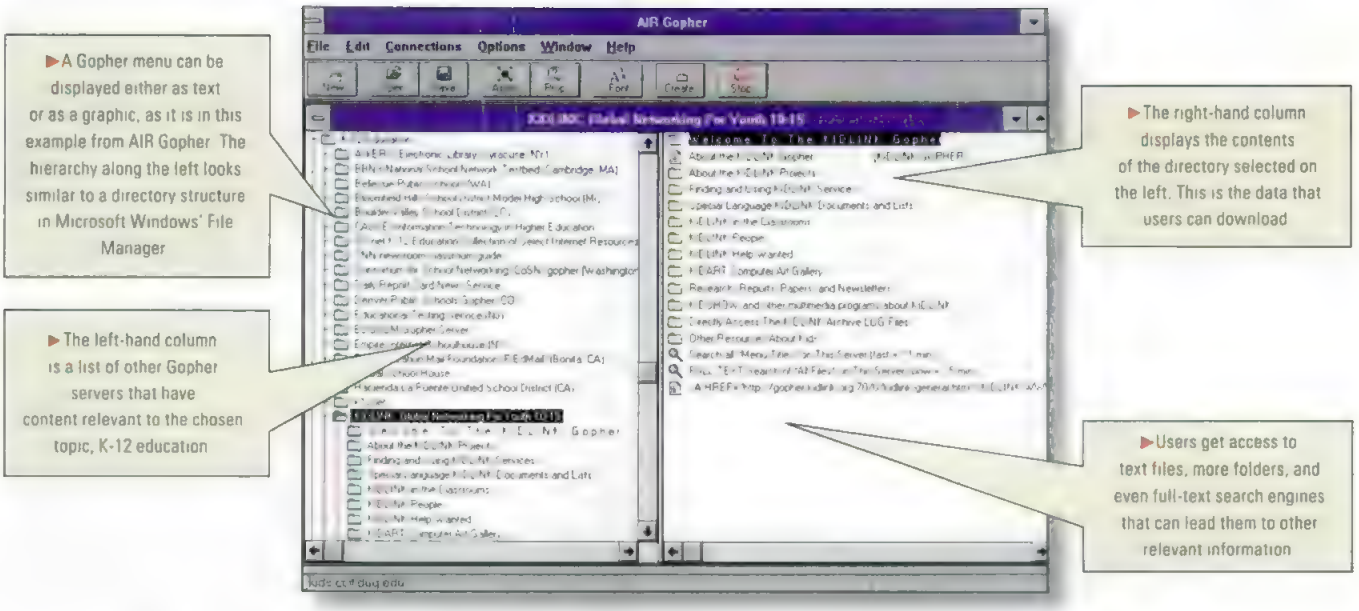
$89.95*

*$$$ plus applicable taxes.

COREL®

Call now for faxed literature!
1-613-728-0826 ext. 3080
Document #1122

CIRCLE 020 ON READER SERVICE CARD



Letting Customers DIG THROUGH YOUR DATA

By Kevin Reichard

Making your business accessible on the Internet can be a lot more complicated than merely making the physical connections to the Internet and posting a few World-Wide Web pages for public consumption. It's important to learn which Internet organizational tools are available and how you can implement them on your network.

THREE APPROACHES

You can set up an information server using any of the following three technological approaches:

- FTP (File Transfer Protocol), which allows users to log on to your server, either through an assigned account or anonymously, in order to transfer files.
- Gopher, a menu-based storage system for files and links to other Internet resources. A Gopher can either be a local client or the server.
- WAIS (Wide Area Information Service), an indexing mechanism for larger databases.

You don't necessarily need all three tools to put your information on the Internet. Still, there's a symbiotic relationship among the three: A WAIS server can be accessed from a Gopher menu or a World-Wide Web browser such as Mosaic or Netscape Navigator (as long as it has the ability to display forms), while both Gopher and FTP servers can also be accessed from a browser or referenced on a Web page.

FTP: OPENING THE DOOR

Enabling FTP is the easiest way to make large quantities of data available to your customers via the Internet. With FTP, you're allowing a portion of your system's directory structure to be open to the public. Any file—whether it originated on a DOS, Macintosh, or Unix system—can be stored on an FTP server.

Though an FTP server can be set up to allow access only to privileged users, the more popular configuration is to allow "anonymous" FTP, where anyone willing to type their e-mail address as a password can enter the system. Anonymous users have access to only a portion of the file system (typically the contents of a directory named */pub*), and they have access to only a few commands, used for retrieving files and maneuvering within subdirectories. If you don't want users storing files on your system, you can change the permissions to read-only, leaving the administrator with the sole ability to move files to the FTP directory.

FTP is built into Microsoft Windows

PC MAGAZINE

SUBSCRIPTION SALE

Answers. Advice. Strategies. Solutions.
22 times a year, you get it all from PC MAGAZINE.

To receive your lowest possible rate, call toll free:

1-800-289-0429

BONUS:
Free Home or Office Delivery

Please mention code 4Z94 to our operator.

Q: What's the best value for your marketing dollar?

A: Reprints, of course!

Dollar for dollar, you just can't beat a reprint of a great review; and there's never been a better time to order. Faster turnaround times and price incentives make this a great time to have your product review or advertisement reprinted. Why not call today? It really makes "cents!"

Contact: Marcia Hazell (212) 503-5412

Carol Peters, Reprints Manager; Ziff-Davis Publishing Company.

ZIFF-DAVIS REPRINTS

ONE PARK AVENUE 16th FLOOR NEW YORK NEW YORK 10016

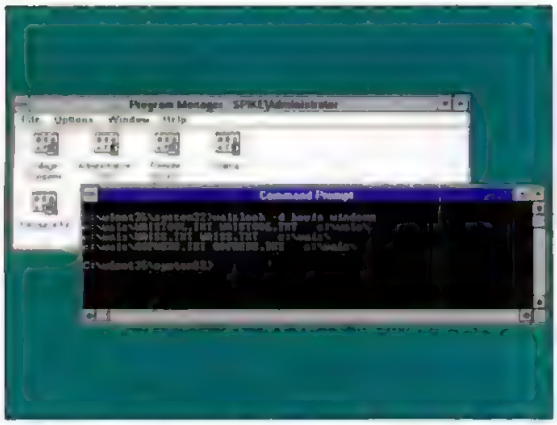
NT 3.5, so there's no need to acquire additional software to implement it on your network.

GOPHER MENUS

Named after the mascot at the University of Minnesota, where the software was developed, *Gopher* refers to both client and server components.

Gopher is built around text menus in a hierarchical directory-style structure. For the user, there's nothing elaborate or complicated about using Gopher. When connecting to a Gopher server, the Gopher client sees a set of entries that can refer either to files on the server itself or resources elsewhere on the Internet. You don't know, or need to know, that a given entry actually points to a file stored on a server in, say, Finland—much less the mechanism for retrieving the file via FTP. You simply select entries and Gopher does the rest. Links can be to other Gopher servers, to files elsewhere on the Internet, or to a WAIS server.

Setting up a Gopher server is slightly more complicated: The links that users take for granted must be created manually by an administrator. When a link dies or moves, the server must be changed manually to reflect it. And the syntax used for setting up Gopher servers is on the obtuse side.



The indexing and checking tools in the EMWAC WAIS tools are controlled from a DOS command prompt under Windows NT. Here, WAISLOOK is used to check which indexed files contain the string windows.

WAIS: THE BIG INDEX

Brewster Kahle, then at supercomputer-manufacturer Thinking Machines Corp., first conceptualized the Wide Area Information Server, or WAIS, as three elements: a client, a server, and an indexer.

Here's how the pieces work together: First, the indexer takes a list of files you want to index and generates from it seven index files. These indexes include a directory of all words appearing in the database, a list of documents and files that constitute the database, and the "headline" of the documents contained in the database (a short summary for users who search the database). WAIS supports more than 30 file formats; for instance, the indexer knows enough not to index the contents of TIFF or PICT image files.

Since it's a very unsecure tool, you'll definitely want to look at firewalls if you operate a WAIS server.

With the index created, you need to tell the rest of the world about it and your server. You can do this automatically by running WAIS with a register option, which places your index next to the hundreds of WAIS indexes already available on the Internet—items such as a legal index from West Publishing, indexes of the speeches of Presidents Clinton and Bush, and countless academic databases. (As with many things on the Internet, there's still a strong academic flavor to WAIS indexes.) When users search through the centralized directory of servers, they'll be linked to your index automatically.

Today, there are both commercial versions and freeware versions (known as freeWAIS and maintained by the Clearinghouse for Networked Information Discovery and Retrieval). The European Microsoft Windows NT Academic Centre (EMWAC) has ported Unix-based freeWAIS to the Windows NT platform, and we evaluate it here.

The one drawback to running a WAIS server is that it's a very unsecure tool. You'll definitely want to look at firewalls if you're planning on operating a WAIS server (for more information, see "Will Your Business Be Safe On-Line?").

PC-BASED INFO-SERVER TOOLS

On the server side, the Internet is still primarily a Unix-based world, so it's no surprise that there's a strong link between Gopher and WAIS servers and the Unix operating system. Several firms sell Internet-ready versions of Unix for the PC. These include BSDI's Internet Server 2.0 ($545; Berkeley Software Design Inc., 800-800-4273; *info@bsd i.com*), Slackware Professional Linux 2.1 ($64.95; Morse Telecommunications, 800-606-6773; *support @morse.net*) and SCO Global Access ($895; The Santa Cruz Operation, 800-726-8649). But there are drawbacks to using any of the PC Unixes: price, lack of documentation, and inflexibility. And you'll need to become fluent in aspects of Unix unrelated to the Internet, such as network configurations, account maintenance, and general configuration.

If setting up a UNIX server is too daunting a task, you might want to check out the Windows NT–based Internet products coming to market.

THE TOOLS TO USE

The WAIS and Gopher tools that ship with the Microsoft Windows NT Resource Kit and the Digital Road Map for Windows NT were developed at EMWAC and are based on stable (and free) WAIS tools available for other operating systems. Both Digital Equipment Corp. and Microsoft are financial backers of EMWAC.

With this background, it's no surprise that both the WAIS tools and the Gopher server created by EMWAC are workmanlike, attractive alternatives to their Unix and MVS counterparts. Three distributions (Gopher 0.91, WAIS Server 0.3, and WAIS Toolkit 0.6) comprise several elements and tools, including documentation.

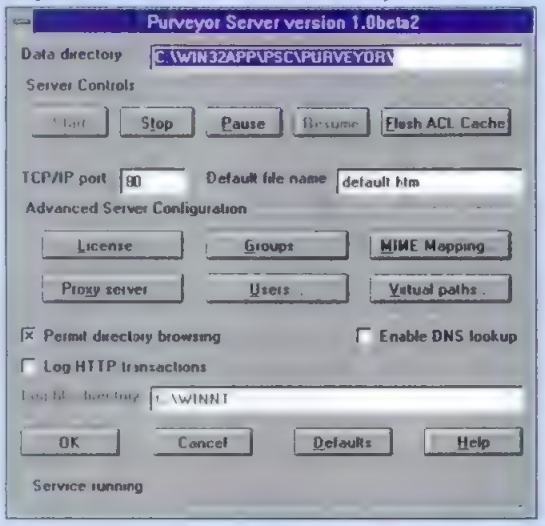
Like their Unix counterparts, the EMWAC tools are broken down by task:

What's Next for Servers?

By Rick Ayre and Amarendra Singh

New World-Wide Web (or HTTP) server packages are appearing at a dizzying pace, and some are coming from companies we've never heard of, or ones not usually associated with this type of software.

Big client/server database companies such as Oracle and Sybase have already announced Web-server products. Many smaller companies that provide Internet connectivity software, such as SPRY and NetManage, have indicated that they intend to compete as well. Then there are companies like Quarterdeck that are trying to change their core business as the software market transforms. New products are also on the way from Architext, BRS, Oracle, PLS.Thunderstone, and Verity (see "Help! I'm Drowning in Data!," Michael J. Miller's column in this issue).



Process Software's Purveyor is one of several World-Wide Web server products based on EMWAC code.

But there's one big stumbling block for all these developers: secure transaction processing. The ability to support secure transactions is imperative if the Internet is ever to be a serious business tool. Today, businesses use these Internet tools mainly for marketing, not selling. In most cases, if you want to buy a product, you must contact vendors by phone or private e-mail, primarily because of the security issue.

Vendors aren't letting this hold up progress, however. The race to develop new products is clearly on.

QUARTERDECK

With the DOS-memory-utility market diminishing, Quarterdeck has been working to build a full set of Internet publishing tools, primarily now for use on the World-Wide Web: WebAuthor, Quarterdeck Mosaic (the working name for their Web browser), Quarterdeck Web Server for Windows, and Quarterdeck Internet Took Kit.

The products will run on Windows 3.*x* and support Common Gateway Interface (CGI) scripts for data from forms. Quarterdeck has yet to determine if its products will support verification, but it will provide HTTPS security. The Web/Author, at $149.95, should be available by the time you read this. Quarterdeck's other three products should be available by mid-1995. To learn more, contact Quarterdeck at *http://www.qdeck.com.*

PROCESS SOFTWARE

Purveyor, Version 1.0, will be Process Software's World-Wide Web server for Windows NT, which is also destined for Win32 platforms such as Windows 95. Version 1.0 will run on Intel platforms and on Digital's Alpha RISC processors if they are running Windows NT 3.5 and above.

Purveyor is built on Microsoft's EMWAC-server code. But it extends the functionality of EMWAC by providing the tools to restrict access to individual HTML pages based on IP address, user name, or both. Transaction logging information—time, date, HTML page, and IP address of the requester—will be implemented, as will Basic Authentication security. Proxy server support will be provided for HTTP, FTP, and Gopher protocols. Pricing for Purveyor will be $1,995 per license. It should be available by the time you read this. For more information, you can contact Process Software at *http://www.process.com.*

FOLIO

Folio Corp., best known for its Folio Views document-management products, has also developed a Web-based publishing tool called Folio Infobase Web Server ($6,995). Like Purveyor, it's being built on top of EMWAC's server. And like Lotus's InterNotes, it's using an existing distribution mechanism (in this case, Folio Views) that extends it to the Internet by replicating on to the Internet. Folio Infobase Web Server should be available in the second quarter. Folio's Web page is not available to the public.

NETSCAPE

Two of the hot HTTP servers in the Unix market now on their way to Windows NT are Netscape Communications' Netsite Communications Server and Netsite Commerce Server. Netsite Communications Server uses HTTP/1.0 access authorization but doesn't support data encryption or server certification. Netsite Commerce Server includes security through implementation of public-key cryptographic technology from RSA Data Security, which provides data encryption and server authentication.

The Unix versions of Netsite Communications Server are priced at $1,495; the Commerce Server is $5,000. The Windows NT products will likely be in the same price range. Contact Netscape at *http://www.netscape.com.* □

WAISINDEX.EXE is used to create the actual WAIS index; WAISTOOL.EXE is used to check the index from a Windows NT DOS command prompt; WAIS.EXE is the WAIS server, installed as a Windows NT service; and WAISSERV.EXE is a Z39.50 protocol handler and search engine.

SETTING IT UP

Creating a WAIS index is simple: You run WAISINDEX on a set of files (preferably stored in their own directory) and seven different WAIS reference files are subsequently created, all of which begin with the name of the index (*data.dic*, *data.doc*, *data.src*, and so on). These files actually constitute the WAIS index. To check the WAIS index from within your system, you use WAISTOOL to search for a string. All of this is done from a DOS command prompt.

The WAIS server and Gopher are installed and configured a little differently. But both are installed as Windows NT services and are controlled via applets in the Control Panel.

SINS OF OMISSION

The EMWAC tools are fairly easy to install and configure, even for someone not fully conversant in the ways of the Internet. The problem may be configuration for someone used to working with WAIS and Gopher tools on a Unix-based system, as there are differences between the EMWAC Internet tools and their Unix counterparts—some major, some minor.

The EMWAC tools are fairly easy to configure, even for someone not fully conversant in the ways of the Internet.

For instance, moving an existing Gopher server to Windows NT may be more problematic than you think. A Unix-based Gopher server relies heavily on hidden files beginning with a dot. Filenames and links to other Gopher servers are both stored in dot files. A FAT (file allocation table) file system, however, chokes on files beginning with a dot. Although the EMWAC Gopher does have a Unix compatibility mode for precisely these situations, it can't be invoked on a FAT file system. In addition, some central features found in freeWAIS aren't found in the EMWAC WAIS tools. The most glaring omission is any sort of security measure. FreeWAIS, for instance, allows server-access control, which permits access to server files by specified users, as well as per-directory access control for specified users. EMWAC WAIS tools don't have either of these features. Similarly, later versions (2.*x*) of Gopher on a Unix platform feature an access token, which lets you specify which machines can perform specific actions. Though you should be looking at additional security measures for your Internet setup no matter which platform you're on, the total lack of security in EMWAC WAIS and Gopher is troubling.

All the utilities are available on-line from *ftp.emwac.rf.ac.uk*, in the *pub/gophers*, *pub/waiss*, and *pub/waistool* directories.

HP Colorado T1000

IT'S NEW. IT'S MORE THAN TAPE BACKUP.

Protecting critical files is important, but it's not the only reason for buying a tape system. Move large files from home to office. Store important old records on tape. Use it to free up disk space. Once you think about tape as a data management system, it's easy to justify an *affordable** HP Colorado T1000.

The easiest, most reliable way to protect and manage your PC's most valuable component... Your Data.

With new high capacity Travan cartridges and Colorado Backup for Windows™ one-button automated software, the T1000 is the perfect match for your data. And, since it's from the world leader in tape backup, you know quality and reliability are built in. Call 1-800-294-6159 for more information.

COLORADO MEMORY SYSTEMS
A division of HEWLETT PACKARD

*$235 List Price. Dealer prices may vary.

© 1995 Colorado Memory Systems, a division of Hewlett-Packard. All rights reserved. Colorado and Jumbo are registered trademarks of Colorado Memory Systems. Windows is a trademark of Microsoft Corporation. TRAVAN is a trademark of 3M.
T1E-PCM031695

CIRCLE 073 ON READER SERVICE CARD

THE (our desktop laser printers keep no secrets from network managers) COMPANY

4505 LASER
600 x 600 DPI
5 PPM
UP TO 8.5 x 14
UP TO 16 MB RAM

4510 LASER
600 x 600 DPI
10 PPM
UP TO 8.5 x 14
UP TO 16 MB RAM

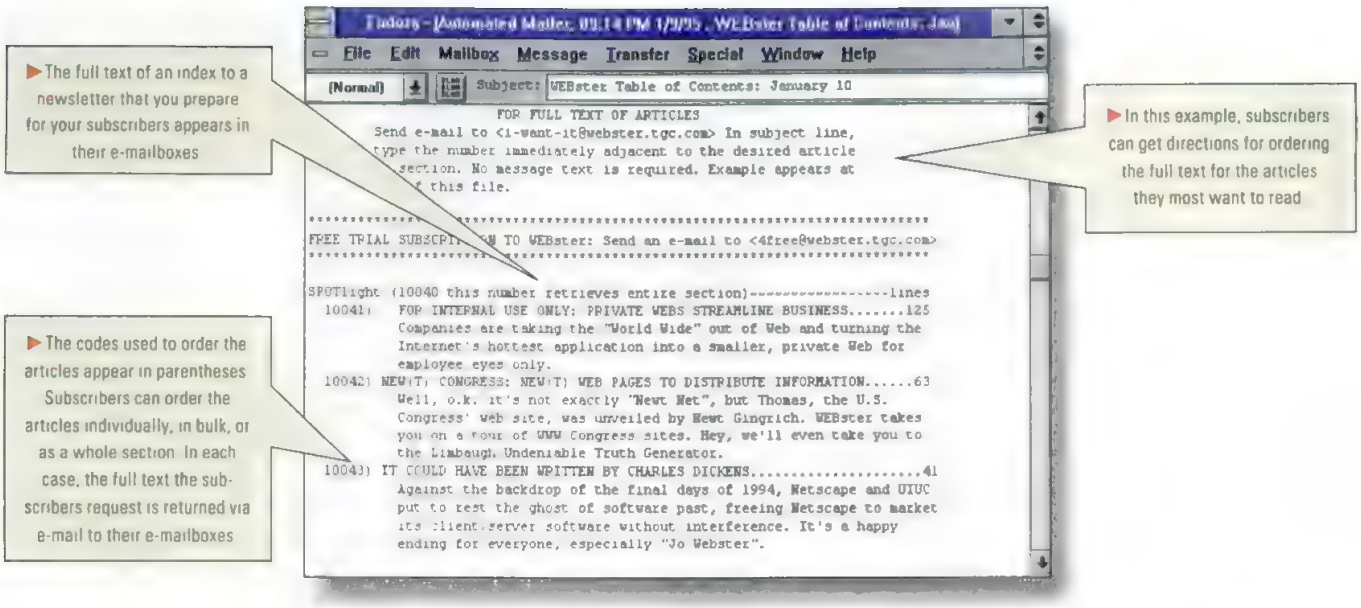
4520 LASER
800 x 800 DPI
20 PPM
UP TO 11 x 17
UP TO 125 MB

Xerox desktop laser printers think about you. That's why the 4500 family of network printers have bi-directional client and network software. It enables easy installation, allows remote configuration and gives usage and charge-back reports in real time. Your end-users stay happy because it takes them through the printing process step by step. Of course, it all comes with the Xerox Total Satisfaction Guarantee. So why settle for printers you don't have to think about, when you can get printers that think about you. To talk with us, call **1-800-34-XEROX ext.102.**

THE DOCUMENT COMPANY
XEROX

XEROX® The Document Company,® the 4500 series and the stylized X are trademarks of XEROX CORPORATION 38 USC 380

CIRCLE 942 ON READER SERVICE CARD



LEVERAGING E-MAIL

By Kevin Reichard

If there's one common denominator for users of the Internet and on-line services, it's text-based e-mail: Everybody's got it; everybody *uses* it. Given this universality, there are a number of ways your business can take advantage of e-mail to send information to potential clients and customers. In fact, you can communicate with those customers via e-mail even if their only access to mail comes through a commercial service such as America On-line or a local bulletin board system (BBS).

Essentially, you use e-mail to send information from a server you've connected to the Internet. This information may be an ongoing, specialized discussion of some sort, a regular mailing, a text file, or even software. In this story, we give some examples of the different ways e-mail is being used to spread news and information to the most targeted audience of all: people who contact you directly.

MAILING LISTS

Much of e-mail's power is centered around mailing lists and the software that generates them. In this context, a *mailing list* is both active and passive—not only a list of mail recipients in the sense we normally think of it, but also, the automatic distribution of mail items to the hundreds or even thousands of "subscribers" on such a list. Listserv or Majordomo software running on Unix or MVS platforms handles these mailings, automatically placing subscription requests into a database and generating periodic mailings—monthly, weekly, daily, or even hourly. Currently, there are no mailing-list servers that run on DOS, Microsoft Windows, or Microsoft Windows NT platforms.

A mailing list is usually centered around a specific topic, and there are countless examples on-line today, some with commercial bents, others for science and academia, and others strictly for entertainment. The single most popular mailing list, according to several Internet sources, is the David Letterman Top Ten List, with over 27,000 subscribers. There's nothing unique about the Top Ten List; it's syndicated by CBS Radio nationwide and can be found on various other Internet sites. But it is unquestionably a great marketing tool for CBS. All those subscribers have, in effect, asked to be reminded about David Letterman's show on a daily basis, and it takes little or no work for CBS to send them what they want.

HOW SUBSCRIBERS REACH YOU

The exact process subscribers use to get on a mailing list varies, depending on the mechanism used to process the request. For instance, to subscribe to the David Letterman Top Ten List, users can send a

See.

It's that simple.

Just open these colorfully illustrated guide-books and watch the answers to your software questions unfold.

The How To Use books from Ziff-Davis Press make computing easy by presenting each task visually on two facing pages. You'll see what you want to achieve, and exactly how to achieve it.

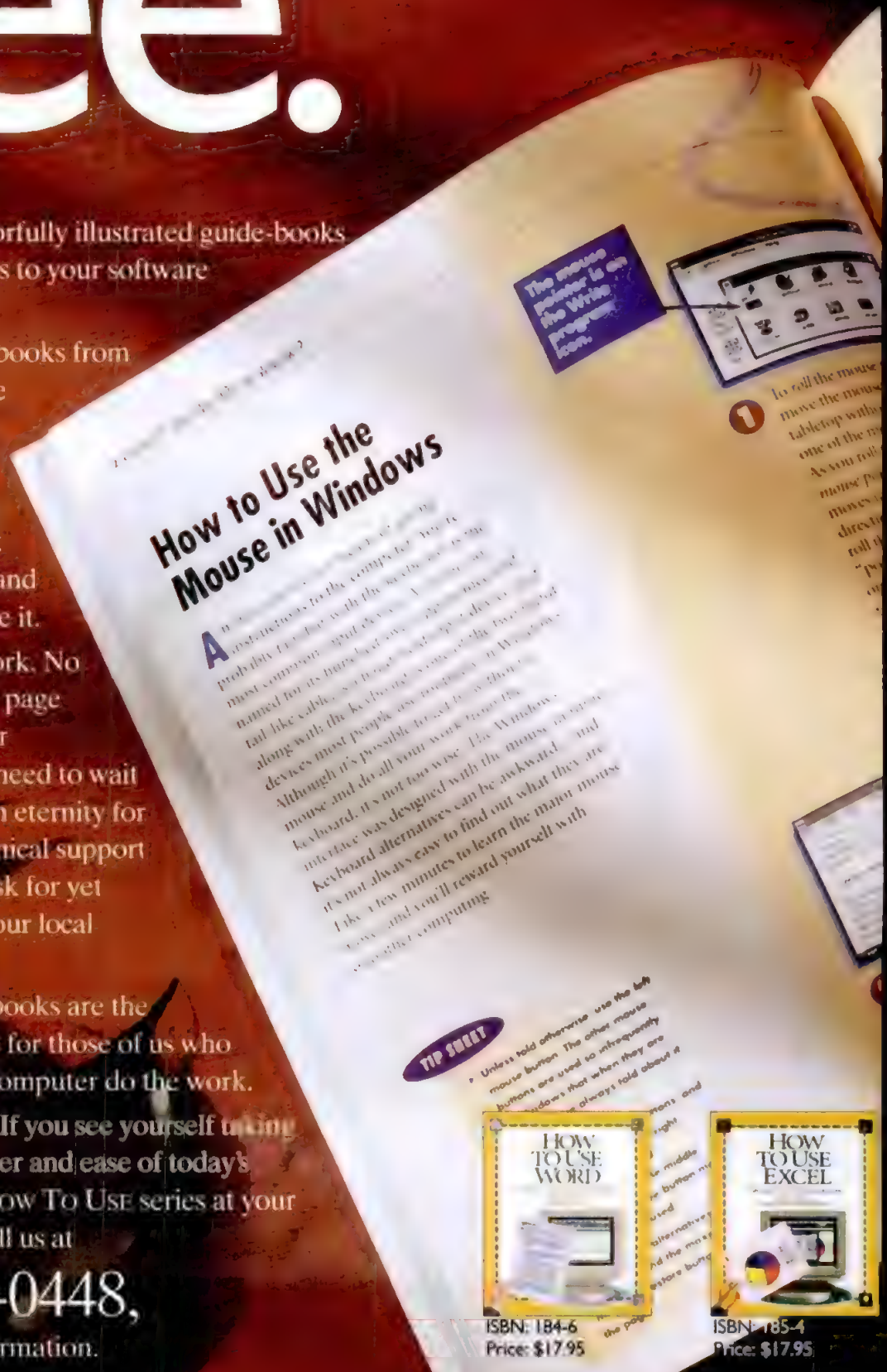
There's no guess work. No need to plow through page after page of the other computer books. No need to wait for what seems like an eternity for your turn on the technical support hotline. No need to ask for yet another favor from your local computer expert.

The How To Use books are the affordable alternative for those of us who would rather let the computer do the work.

Seeing is believing. If you see yourself taking advantage of the power and ease of today's technology, see the How To Use series at your local bookstore, or call us at

1-800-688-0448,

ext. 259 for more information.



ISBN: 184-6
Price: $17.95

ISBN: 185-4
Price: $17.95

How to Use the Mouse in Windows 3
2
To click on something means to point to it with the mouse so the mouse pointer is on top of it and then press and instantly release the left mouse button. To double-click on something means to point to it and then click the left mouse button twice in rapid succession
Drag across a word to select it. Then press the Delete key to delete it.
3
To drag the mouse means to point to something, press and hold down the left mouse button, roll the mouse, and then release the mouse button. For example, you can "select" a block of text for deletion by dragging from one end of the block to the other
4
Scrolling is one of the most common mouse actions. When a document window cannot accommodate all its contents at once, point to a scroll arrow and hold down the left mouse button to "scroll" the display in the direction of the arrow
Point here and hold down the left mouse button to scroll down through the document.
There is a book for every major software package, with new titles publishing every month.
HOW TO USE WINDOWS
ISBN: 190-0
Price: $17.95
HOW VIRTUAL REALITY WORKS
ISBN: 230-3
Price: $24.95
HOW MULTIMEDIA WORKS
ISBN: 208-7
Price: $24.95
HOW TO USE THE INTERNET
ISBN: 222-2
Price: $17.95
ZIFF-DAVIS
ZD PRESS
Ziff-Davis Press
Microsoft is a registered trademark and Windows is a trademark of Microsoft Corporation.

request either to the originating Listserv server (*listserv@list-serv.clark.net*) or to a Listserv server that sends along subscription requests to other Listserv servers (such as *listserv@listserv.net*). Because these lists are text-based, subscribers can use a commercial on-line service such as America Online or MCI Mail to join the mailing list and to receive its publications.

The Listserv software will automatically grab your e-mail address from the incoming subscription request. If you're using a mail program that adds signature files, you don't include your signature file in this instance, as the Listserv software will strip it out. It's important to note that this procedure works for the Listserv software only; other types of mail-server software, such as Majordomo, work a little differently.

If the idea of putting mailing lists to work in your business intrigues you, you should be aware that you don't have to set up your own Unix server to run a mailing list. You can contract with a service provider to set up and maintain the list for you, or simply to give you server space if you have the in-house talent to maintain the list yourself.

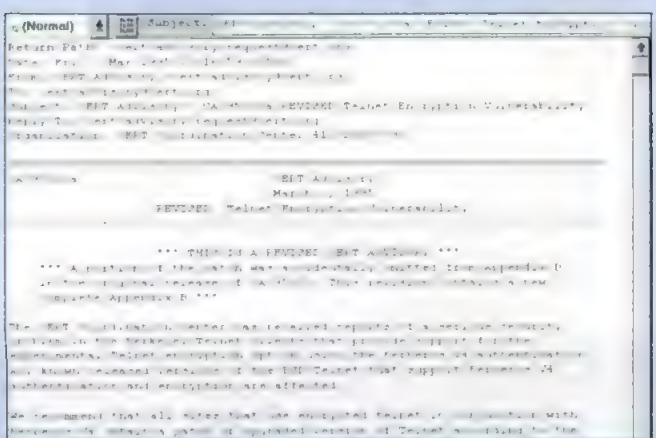
E-ZINES

The convenience of mailing lists has also spawned a new world of electronic magazines, or "e-zines." These are the ultimate in do-it-yourself publishing, requiring little more than an e-mail account and some gumption. Though you may not need an entire magazine to market your business on-line, the format is an interesting and potentially useful one, regardless of the actual size of the publication. To see a good example of an e-zine, check out Voices from the Net, an intelligent attempt to make sense of the fast-growing "Net"—in broader terms, the Internet, on-line services, and BBSs. (Send subscription requests to *voices-request@andy.bgsu.edu*; in the subject field, enter *voices from the net*; in

Successful E-Mail Strategies

By Kevin Reichard

As these six screens show, the e-mail your customers receive from you over the Internet isn't always pretty. If good looks matter more to you, investigate the World-Wide Web as a method of distributing information. What e-mail and mailing lists can do is provide your business with a way to keep your customers updated about and interested in your products and services, and to respond to their individual questions as quickly as you can. It's a very cost-effective tool: Your customers come to you without your having to look for them.



If you're worried about security and your Internet installation, you'll want to subscribe to the Computer Emergency Response Team (CERT) Advisory, which details security lapses on the Internet and the measures you can take to prevent damage at your site. This mailing list proves that even if you have very technical information you want to distribute, you can find an audience for it. To subscribe, send e-mail to *cert-advisory-request@cert.org*, with "request" as the subject line

The Netsurfer Digest has more news about the Internet than anyone could ever want to know. This e-zine's distribution is unique: It's mailed either as straight text or as a HTML document, as HTML, it can be loaded into your browser, and its links to other World-Wide Web pages are activated. That's one way to get around the text-only restriction of e-mail (see above). Subscribers pay nothing, but they must be willing to receive one message containing marketing materials each week. Send e-mail to *nsdigest-request@netsurf.com*. To subscribe to the text version, place "subscribe nsdigest-text" in the first line of the message; to subscribe to the HTML version, put "subscribe nsdigest-html" in the first line of the message.

the body of the message, enter *subscribe*.)

Not all e-zines are distributed via e-mail, of course. More graphically ambitious offerings such as Global Network Navigator or HotWired require subscribers to log onto World-Wide Web home pages. But even HotWired maintains a mailing list that updates subscribers weekly. It's one example of a business that's using a mix of on-line strategies to reach out to customers.

GROUP DISCUSSIONS

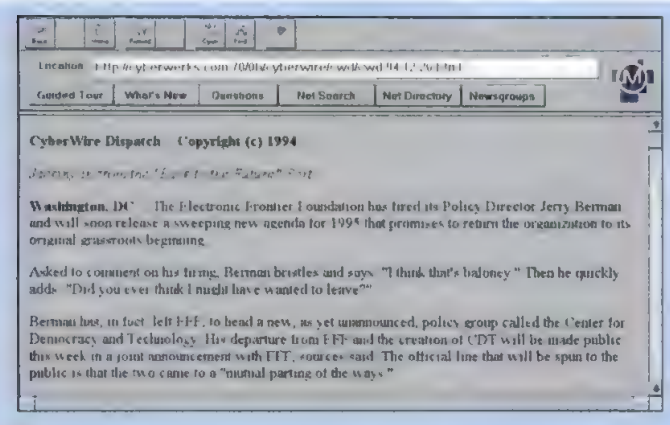
Discussion lists are similar in some ways to mailing lists, but while mailing lists are sent to subscribers in one batch, discussion lists forward messages one at a time.

How can a discussion list help a business? On one level, just by being there: IBM, for example, gains a fairly clear marketing advantage merely by maintaining a forum that serves the needs of OS/2 devotees. A subscription to the OS/2 Users Mailing List at *listserv@vm1.mcgill.ca* yields 10 to 40 messages a day, all concerning OS/2. Subscribers can respond to the person making the original post or send a response back to the full group. IBM doesn't necessarily have to do a thing, yet they're clearly getting marketing mileage out of all the e-mail traffic.

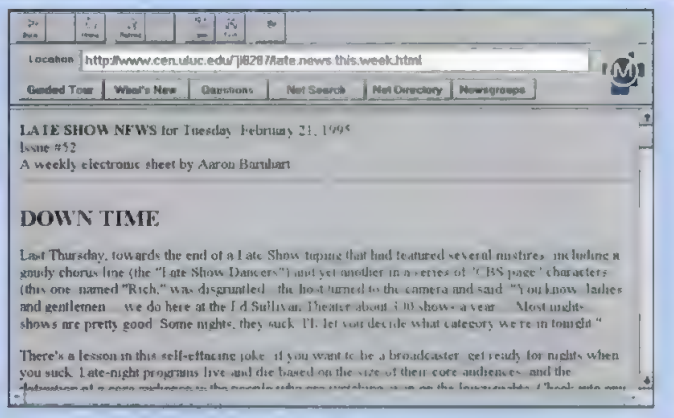
INFORMATION, PLEASE

One of the most valuable parts of a typical Usenet newsgroup is its Frequently Asked Question (FAQ) compilation.

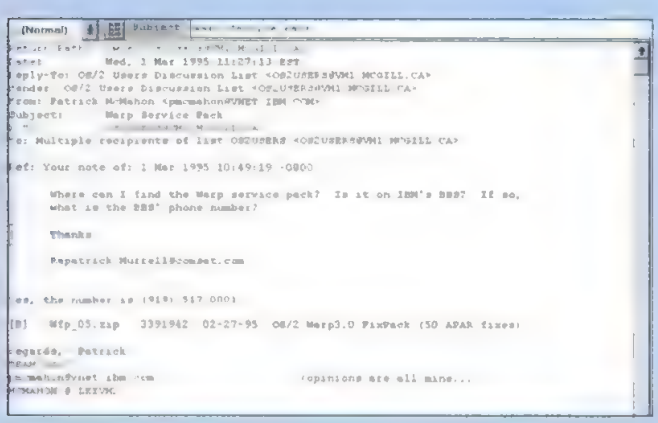
Businesses can use the FAQ tactic to respond immediately to individual questions sent via e-mail by potential customers. If you prepare canned answers to the questions your business gets most frequently, any administrative assistant can instantly respond to a query by sending a FAQ, and your business earns a reputation for being highly responsive. □



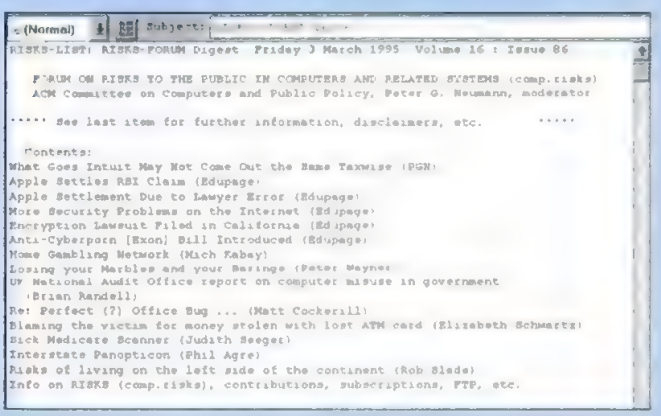
■ Brock Meeks' insightful CyberWire Dispatch is essential reading for anyone interested in the development of the Internet, both in a cultural sense and in a business sense. Meeks started this list with virtually no help and no backing. If you have information people want, they will find you (send a subscription request to *majordomo@cyberwerks.com*, with "subscribe cwd-l" as the first line).



■ Aaron Barnhart chronicles the late-night television scene with the weekly Late Show News, offering commentary on the likes of David Letterman, Jay Leno, Tom Snyder, and more. It's fun for fans, and it's essentially free marketing for the shows. To subscribe, send e-mail to *listproc@echonyc.com* with "SUBSCRIBE LATE-SHOW-NEWS Your Name" as the body of the message.



■ IBM OS/2 users can exchange information via the OS/2 Users Mailing List. Postings are sent directly to every subscriber. This list is a good example of how e-mail can be used to help keep any kind of special-interest group active and informed. To subscribe, send e-mail to *listserv@mcgill1.bitnet*, with "SUBSCRIBE OS2USERS first_name last_name" on the first line of the message.



■ Worried that computers pose a threat to your privacy? Subscribe to the Risks Digest, generated by the ACM Committee on Computers and Public Policy. This is an example of brokered information, a "best-of" mailing list where subscribers get information that's already been culled and condensed. To subscribe, send e-mail to *listserv@uga.bitnet*, with "subscribe risks" in the body of the message.

PROTOTYPE .EXE

The Fastest Way to the Fastest Applications

RADical Performance

Delphi is the fastest way from inspiration to application.

The next generation is here!

Now you can create .EXEs that are up to 10 to 20 times faster than interpreted code! Only Delphi™ combines the most intuitive visual design environment, with the unrivaled performance of a 350,000-lines-per-minute* native code compiler. There's simply no faster (or easier) way to deploy royalty-free, and blazingly fast, Windows applications.

RAD from prototype to production

Delphi makes it easy to start writing productive code immediately. You get a comprehensive suite of visual design and debugging tools to accelerate development. So you move seamlessly from prototype to deployment. You'll create high-performance applications in record time with Delphi's gallery of reusable forms, project templates, programming experts, and context-sensitive help. Delphi is a true object-oriented development tool. So the high-performance applications you build with Delphi become incredibly robust, easily maintained, and extensible solutions.

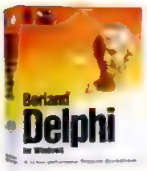
"Delphi is Visual Basic done right."

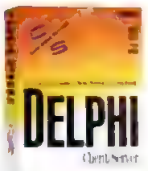
PC Computing—February 1995

Also available!

Delphi Client/Server edition

- High-performance native SQL drivers for Oracle, Sybase, MS SQL Server, Informix,* and InterBase*
- Unlimited license for developers to deploy standalone SQL-based applications
- Complete source code files for all Delphi's included components help you create your own custom components
- Team development support with integrated links to the PVCS version control software
- Award-winning report writer, ReportSmith 2.5 SQL, gives you SQL connectivity





The ultimate in component reusability

Delphi is the perfect complement to your programming toolset. With it you create DLLs that can be called from applications built with C++, Visual Basic, PowerBuilder, Paradox,* or dBASE.* You can even add your own reusable objects, DLLs, VBX controls, or OLE 2.0 servers to Delphi's open, integrated, component-based development environment.

Client/server development just got easier

Delphi includes the built-in ANSI SQL-92 compliant Local InterBase Server, easy access to Paradox/dBASE data, and ODBC support. So you can rapidly prototype full client/server applications on your standalone desktop. Then, by upgrading to Delphi Client/Server, you can quickly deploy applications across the entire enterprise. And all the work you do in Delphi today will be fully compatible with Delphi's forthcoming 32-bit, Windows 95 release.

Put Delphi's RADical performance in Windows development to work for you today. It's the fastest way from inspiration to application.

See your reseller or call today. 1-800-336-6464, ext. 9952

In Canada call: 1-800-461-3327 • Internet: type http://www.borland.com/ • CompuServe: type GO BORLAND

Borland

REGISTER NOW! **Borland Developers Conference • August 6–9, 1995 • San Diego, CA • 1-800-350-4244** REGISTER NOW!

*90MHz Pentium. Copyright © 1995 Borland International, Inc. All rights reserved. All Borland product names are trademarks of Borland International, Inc. Borland's IDEA PAD products and services are not associated with or sponsored by Delphi Internet, an on-line service and Internet access provider. BI 8508.11

CIRCLE 287 ON READER SERVICE CARD

Now you can access your Lotus Notes database without starting Notes. Our Extending Your Apps column shows how your programs can use those databases—just as if they were regular data files.

User-to-User

BY NEIL J. RUBENKING

Printing Screens in Windows

Here's an easy way to print screens of DOS applications in Microsoft Windows 3.11: Use the Shift-PrtSc key combination. To test this, choose Run from Program Manager's File menu, type `EDIT TEST.TXT`, and press OK. When the editor opens, note that simply pressing PrtSc will place the contents of the window in the Clipboard. Now press the Shift and PrtSc keys together and you'll find that the print contents are sent to the local printer.

Lynda Louis
via ZiffNet

▶**PC MAGAZINE:** Just to run down your options, PrtSc alone copies an image of the whole screen to the Clipboard. Alt-PrtSc copies an image of the active window to the Clipboard, whether it's from a Windows application or a windowed DOS box. And as noted here, pressing Shift-PrtSc in a DOS box (windowed or full-screen) bypasses this process and prints the DOS box's screen as text. The Windows manual is a bit misleading; it suggests that if PrtSc doesn't copy the entire screen to the Clipboard, Shift-PrtSc or Alt-PrtSc might. And it says that if Alt-PrtSc doesn't copy an image of the active window, Shift-PrtSc might.

Note that to get the full range of PrtSc behavior, you must be running in 386 Enhanced mode. Windows for Workgroups runs only in 386 Enhanced mode, but if you're running Windows 3.1 in standard mode, you're forced to run DOS programs full-screen and you can't copy their contents to the Clipboard with Alt-PrtSc.

Stopping the Windows 3.1 StartUp Group

The addition of the StartUp group in Windows 3.1's Program Manager was a great enhancement. There's an advantage in using the StartUp group over the LOAD line because of an undocumented (at least as far as I can tell) override. If you want to skip the StartUp group items, simply type WIN and Enter, and then hold down the Shift key (sounds like MS-DOS 6.0, doesn't it?). I wasn't even aware that this might be an undocumented feature until I discovered that many experienced Windows users didn't seem to be aware of it. Other *PC Magazine* readers may find it useful too.

Bryan Johnson
via ZiffNet

▶**PC MAGAZINE:** To suppress the loading of items in the Windows 3.1 StartUp group, you hold down a Shift key until you see Program Manager. To suppress the loading of AUTOEXEC.BAT and CONFIG.SYS in DOS 6.0, you hold down the Shift key during the boot process until you see the DOS prompt. So yes, there certainly is a parallel!

The LOAD= and RUN= lines are holdovers from earlier versions of Windows. In Windows 3.1, you should use the StartUp group instead, as it has a number of advantages. For one, a program loaded in the StartUp group can have command-line parameters, while a program loaded on the LOAD= or RUN= line cannot. Also, it's a snap to change the contents of the StartUp group by dragging icons in and out of it.

If you regularly need to load two distinct sets of programs at start-up, you can create a second start-up group with a name like Startup2. To use this alternate group, before starting Windows find the line Startup=Startup in the [Settings] section of PROGMAN.INI and change it to Startup=Startup2 (or whatever name you chose for your alternate start-up group).

Microsoft's Windows Resource Kit (WRK) contains a minor error regarding the RUN= line. It says, "To change this entry, add the application to the StartUp group in Program Manager". The text for the LOAD= line is the same, with the added admonition to check off the Run Minimized box. In fact, moving items into and out of the StartUp group has no effect on the LOAD= and RUN= lines!

▶ IN THIS SECTION

Tutor 249
Tech Notes 255
Extending Your Apps 263
Toolkits 271
Power Programming 273
Utilities 283
Solutions 293

Printer Echo Revisited

The September 28, 1993, User-to-User column showed a method of finding DOS's internal printer-echo flag. Though that item was titled "The Final Word on Printer Echo," I hope you'll present PECHO.COM, a simple TSR that is really useful. Using the flag data, the program toggles the Scroll Lock keyboard light in sympathy with the printer-echo flag. Thus, the light is on when printer echo is on, and it's off when printer echo is off. As far as I can tell, the Scroll Lock light is never used, and PECHO overrides the Scroll Lock key's effect on that light.

PECHO checks the printer-echo flag every time a key is hit, appropriately changing the state of the bit in the keyboard flag byte that controls the Scroll Lock light. You can create PECHO.COM using the DEBUG listing shown in Figure 1.

Ted Mallett
Ottawa, Ontario, Canada

```
N PECHO.COM
A
JMP     0144
                        ;storage for address of int 9
DW      0,0
                        ;storage for address of Ctrl+P flag
DW      0,0
                        ;storage for value of Ctrl+P flag
DB      0
                        ;dummy byte for alignment
DB      0
STI                     ;open interrupts
PUSHF                   ;push the...
PUSH    AX              ;used registers
PUSH    BX
PUSH    DS
CS:
LDS     BX,[0106]       ;load Ctrl+P flag address
DS:
MOV     AL,[BX]         ;get flag value
CS:
MOV     [010A],AL       ;store it
MOV     AX,0040         ;segment for keyboard flag byte...
MOV     DS,AX           ;... with sector to get ...
MOV     BL,[0017]       ;keyboard flag for Scroll Lock bit change
CS:
MOV     AL,[010A]       ;value of Ctrl+P flag
CMP     AL,00           ;is it 0? is printer echo off
JZ      0133            ;it is, so jump
OR      BL,10           ;prn echo on, so Scroll Lock lamp on
JMP     0136            ;continue
AND     BL,EF           ;prn echo off, so Scroll Lock lamp off
DS:
MOV     [0017],BL       ;initiate Scroll Lock lamp state
POP     DS              ;pop...
POP     BX              ; ... the used registers
POP     AX
POPF
CS:
JMP     FAR [0102]      ;go to normal interrupt 9 business
                        ;INSTALL
MOV     AH,34           ;get InDOS address
INT     21              ;do it
MOV     AX,BX           ;offset ...
SUB     AX,0023         ;... minus 23h for Ctrl+P flag
MOV     [0106],AX       ;store address
MOV     [0108],ES
MOV     AX,3509         ;get the current interrupt 9 address
INT     21              ;do it
MOV     [0102],BX       ;store address of interrupt 9
MOV     [0104],ES
MOV     DX,010C         ;address to start resident program
MOV     AX,2509         ;point interrupt 9 to it
INT     21              ;do it
MOV     AX,3120         ;function 31h errorlevel 32d
MOV     DX,0020         ;reserve 20h pages (200h bytes)
INT     21              ;terminate and stay resident

RCX
071
W
Q
```

***Figure 1:* PECHO.COM, the TSR generated by this DEBUG script, links the keyboard's Scroll Lock light to the status of DOS's printer echo feature.**

►PC MAGAZINE: Pressing Ctrl-P toggles DOS's printer echo feature; if it's off Ctrl-P turns it on, and vice versa. When printer echo is active, every character sent to DOS's standard output device is echoed to the printer. This includes the commands you type at the DOS prompt plus the output of all but a few DOS commands. Printer echo can be handy for creating a paper trail of your actions to show a support technician, for example. And programming students are often requested to run their programs with printer echo enabled and hand in the resulting printout.

Unfortunately, there's no way to tell whether printer echo is on or off; all you can do is enter a command and see what happens. If the command is echoed to the printer (or DOS displays a "Write fault error" message), printer echo is on; otherwise it's off. If you find the printer echo feature useful in your work, the tiny PECHO utility will provide a handy indicator of its current status.

For those who are interested, the DEBUG script in Figure 1 is thoroughly commented. You can omit the comments, though, if you're typing the listing into your own computer. To create PECHO.COM from PECHO.SCR, enter this command at the DOS prompt:

```
DEBUG < PECHO.SCR > PECHO.LOG
```

If you find the string `^ Error` in the log file, correct the error in the script and process it again. Otherwise, you've created PECHO.COM. If you want to use PECHO without worrying about how it works, you can download it from PC MagNet.

Here's one small caveat: PECHO is not a sophisticated TSR; it doesn't detect whether another copy of itself already exists in memory. If you load it repeatedly, each copy will use up 528 bytes plus enough memory for a copy of the current set of environment variables. The best way to use PECHO is to load it from your AUTOEXEC.BAT and nowhere else. □

Tutor

BY JEFF PROSISE

It All Adds Up: How Computers Do Arithmetic

We no longer think of computers as machines that simply *compute*, or calculate. But the simple arithmetic tasks—addition, subtraction, multiplication, and division—are essential to any computer's operation. This is true whether you're calculating a spreadsheet, displaying a new font in your word processor, or playing a sound-and-video clip.

If you read this column in our issue of January 10, 1995, you learned how dynamic random access memory (DRAM) works. One DRAM cell, which stores a single bit of information in computer memory, consists of a transistor and a capacitor. The capacitor stores the bit's value; a charge in the capacitor represents a 1, while a lack of charge represents 0. The transistor acts as a miniature switch. When closed, the switch completes a circuit between the capacitor and a conductor known as a bit line, allowing the capacitor's charge to be read or written. Put millions of these tiny cells together and throw in some supporting circuitry, and you have the equivalent of a modern-day DRAM chip or SIMM.

This time around we're going to investigate how a computer does arithmetic—specifically, how it adds two numbers and comes up with a result. We'll start by reviewing the binary numbering system and performing some simple binary addition by hand. Then we'll look at the specialized circuitry that the microprocessor inside your PC uses to add 1s and 0s. Finally, we'll see how simple circuit blocks are put together to form full-blown adders. Best of all, you won't need an electrical engineering degree to follow along. If you can understand the difference between on and off, you can understand how computers do arithmetic. No kidding!

THINKING IN 1s AND 0s Most everyone knows that digital computers think in 1s and 0s. Using the base-2, or *binary*, numbering system, a computer represents large numbers with strings of 1s and 0s. Here's how a computer would count from 1 to 10 in binary:

```
    1
   10
   11
  100
  101
  110
  111
 1000
 1001
 1010
```

Each "place" in a binary number represents a power of 2, just as each place in a decimal number represents a power of 10. The digits in a 3-digit decimal number, for example, specify, from right to left, ones, tens, and hundreds. Similarly, the digits in a 3-digit binary number signify ones, twos, and fours. Hence, the binary number 101 equals (4*1) + (2*0) + (1*1), which equals 5.

You can add binary numbers just as you add decimal numbers: Line them up so the individual digits form columns, add digits in one column at a time from right to left, and if there's an overflow, carry it to the next column to the left. Consider, for example, how 17 and 18 are added in the decimal numbering system:

```
  1
  17
+ 18
  ==
  35
```

First, 7 and 8 are added, producing 15. Since 15 is greater than 10, the 5 in the ones place is written down and the 1 in the tens place (shown shaded here) is carried over to the next column. Adding the two numbers in the leftmost column and the 1 carried from the previous column yields 3, giving us a final result of 35.

Now let's consider how a computer adds together the binary numbers 0111 and 0010:

```
  110
  0111
+ 0010
  ====
  1001
```

The procedure is exactly the same, but now a 1 is carried when two or more 1s are encountered. Since the binary value 0111 is equal to 7 decimal, 0010 is equal to 2, and 1001 is equal to 9, the computer just calculated that 7 plus 2 equals 9. Simple stuff, really. I remember learning base-2 math back in elementary school and wondering what on earth I was ever going to need it for. Now I know.

LOGIC GATES The previous section reveals in an abstract way how computers add binary numbers, but it says nothing about the circuits involved. The second step in understanding how a computer adds is learning about *logic gates* and *truth tables*. A logic gate is a simple electrical element that takes one or more inputs and generates an output whose value depends on the values of the inputs. A gate's truth table defines what output will result for each combination of inputs. Input and output values are represented by voltages. Typically, 5 Volts represents a 1 and 0 Volts represents a 0. We'll use 0s and 1s rather than voltages for our discussions because they more clearly illus-

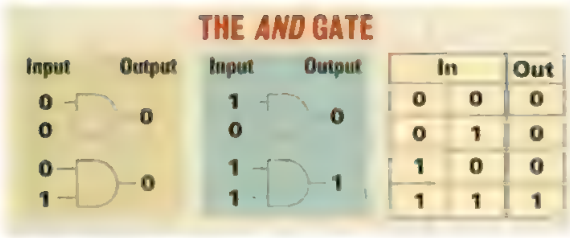


Figure 1: **The AND gate accepts two inputs, each with a value of either 1 or 0, and outputs 1 only if both inputs are equal to 1. The truth table lists the output value for each possible combination of input values.**

trate what the computer is doing.

Figure 1 illustrates the AND gate, which is one of the five basic gates used in digital electronics. The AND gate accepts two inputs, each a 1 or a 0, and outputs a 1 if (and only if) the first input *and* the second input are equal to 1. Any other combination of input values produces an output value of 0. Four different combinations of 0s and 1s can be presented at the two inputs, so the truth table for an AND gate has four entries. If you know the values of the inputs, you can consult the truth table and determine the value of the output. Schematically, an AND gate is represented by a symbol that resembles an arched doorway turned on its side, as shown in Figure 1.

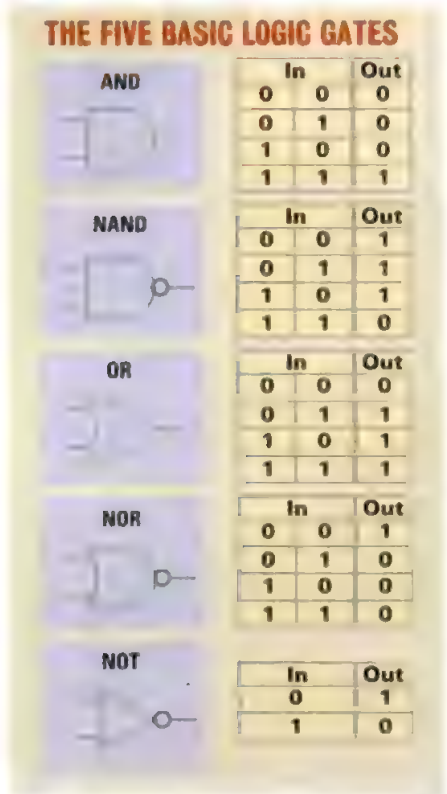


Figure 2: **Schematic representations of AND, NAND, OR, NOR, and NOT gates, and the corresponding truth tables.**

Figure 2 shows all five basic logic gates, the symbols used to represent them in logic diagrams, and their associated truth tables. An OR gate takes two inputs and outputs a 1 if either or both inputs is equal to 1. In other words, it outputs a 1 if input A *or* input B has a value of 1. NAND and NOR gates are the opposite of ANDs and ORs. Wherever the AND or OR gate produces a 1, the NAND or NOR produces a 0, and vice versa. A NAND gate outputs a 0 if and only if both inputs are equal to 1, while a NOR gate outputs a 0 if either or both inputs are 1. The NOT gate simply inverts its input, changing a 0 to a 1 or a 1 to a 0. Since AND and NAND gates produce exactly the opposite output given the same set of inputs, a NAND gate can be built by combining an AND gate and a NOT gate. (Sometimes the reverse is done: An AND gate is built from a NAND and a NOT.) Similarly, a NOR gate can be put together from an OR gate and a NOT gate, or vice versa.

The basic building block for all logic gates is the transistor, which, like a light switch, performs a simple on/off switching. All transistors have three terminals: a *gate* (not to be confused with *logic gate*), a *source*, and a *drain*. The transistor lets current flow between the source and the drain depending on the voltage supplied to its *gate*. There are several types of transistors, and many different ways to combine them to form logic gates.

Figure 3 shows a common way in which four transistors are combined to form a NAND gate. I've represented the type of transistor known as an *n*-channel MOSFET (metal-oxide semiconductor field-effect transistor) as a switch in a circle and an *p*-channel MOSFET in a square. An *N*-channel MOSFET *closes*—or allows current to pass through it—when a 1 is input to its gate, but *opens*—or impedes current flow—when a 0 is input. *P*-channel MOSFETs behave exactly the opposite, closing when a 0 is input and opening when a 1 is input. Figure 3 also illustrates how presenting 1s at both of the gate's inputs completes a circuit connecting the output line to the ground, producing a 0 at the output—exactly the behavior one would expect from a NAND gate. Note that there are no direct connections between the input and output lines. The input lines simply control the circuit's transistorized switches, which in turn control the current to the output lines.

You can verify that other inputs produce the proper results by diagramming the switch settings for various combinations of input values and following the resulting path backward from the output line to the source. In particular, notice that setting either input to 0 closes a square switch and sets the output to high, or 1. Setting both inputs to 0 closes both square switches, once again producing a 1 at the output.

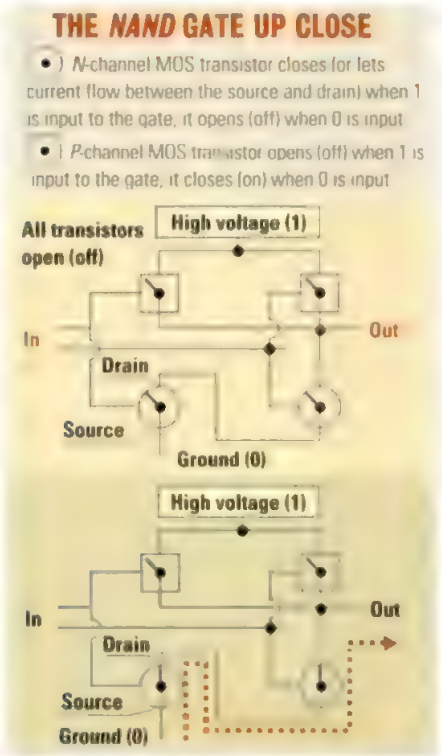
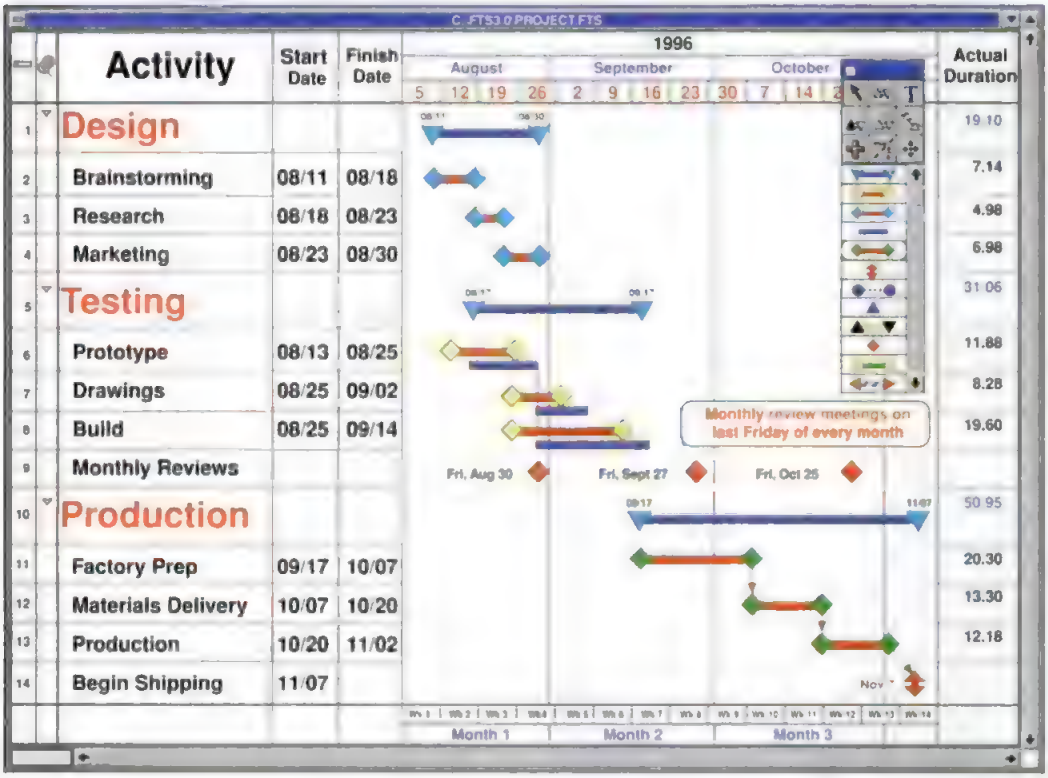


Figure 3: **This arrangement of transistors produces a NAND gate. The bottom diagram illustrates how setting both inputs to 1 forms a path from the low voltage source to the output line, producing a 0 at the output.**

FROM LOGIC GATES TO ADDERS So far you have learned that computers add numbers by adding individual 1s and 0s, and that logic gates allow us to convert

Simple Scheduling. Impressive Power.



Over 75 New Features

Version 3.0

WINDOWS MAGAZINE RECOMMENDED

"FastTrack Schedule... matches or exceeds the competing products in a aspects of project scheduling."

Windows Magazine

MICROSOFT WINDOWS COMPATIBLE

FastTrack Schedule™

No other scheduling tool is as easy-to-use or as powerful as FastTrack Schedule. There's no need for cumbersome project management packages, spreadsheets, or time-consuming drawing programs. Simply click and drag—or use your keyboard—to create presentation quality schedules in no time. And if you have questions, the extensive on-line help can assist, tutor, or remind you of every step.

Need more power? FastTrack Schedule can track scheduled, revised, and actual dates, calculate durations based on a custom work calendar, outline your projects, and link activities to show dependent tasks. Further enhance your schedules with custom bars and milestones, flexible timeline scales, and colorful graphics. And because FastTrack Schedule runs on Windows, Macintosh—and is accelerated for Power Macintosh—files built on one platform can be opened on the other.

See Us at Booth #N6872

WINDOWS WORLD '95

April 24-27, 1995
Atlanta, Georgia USA

To order, for more information or for a demo—Call Today!

1.800.450.1986

AEC SOFTWARE

AEC Software, Inc., 22611 Markey Court, Building 113, Sterling, Virginia 20166 • Telephone 703.450.1980 • ©1994 AEC Software, Inc. All rights reserved.

CIRCLE 249 ON READER SERVICE CARD

One World.

One Communications Software.

PROCOMM PLUS for Windows.

Integrating fax with data opens up a whole new world in communications software.

PROCOMM PLUS for Windows 2.1 is here with new features which are above and beyond all other communications software programs.

First up, you have access to complete fax capabilities including a fax viewer, scheduling, broadcast send, and the ability to receive faxes in the background; all from right within PROCOMM PLUS for Windows.

Plus, you can access your local area net or the vast global village via the Internet with our TCP/IP support for Telnet connections and an easy-to-use FTP file transfer and file management utility. With the fully-customizable Action Bar, you can easily activate frequently used features with immediately understandable icons. You'll find our new Dialing Directory smart enough to serve as a single phone source to organize voice, fax and data calls. Enhanced ASPECT scripts automate on-line sessions with services like CompuServe and MCI Mail. Our GIF viewer displays graphics as you download them. And in the intuitive PROCOMM PLUS tradition, everything is extremely powerful and easy to use.

Call us at 1.800.315.3282 to upgrade for just $69.

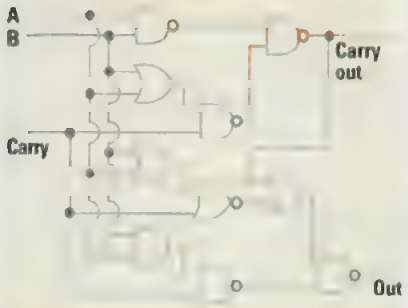
To start fresh, visit your computer retailer. PROCOMM PLUS for Windows 2.1...a whole world is waiting.

PROCOMM PLUS for Windows™

TOTALLY CONNECTED

DATASTORM • P.O. Box 1471 • Columbia, MO 65205 • 314.443.3282

CIRCLE 935 ON READER SERVICE CARD



A	B	Carry	Out	Carry out
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

Figure 4: **This simple 1-bit adder combines logic gates to produce a circuit that adds two binary digits and a carry value generated from a previous addition.**

various combinations of 1s and 0s into outputs equaling 1 or 0. If you suspect that somehow these logic gates are combined to produce circuits that add digits representing binary numbers, you're on the right track.

Figure 4 shows how one AND gate, five NAND gates, three OR gates, and one NOR gate can combine to form a circuit known as an *adder*. The circuit takes

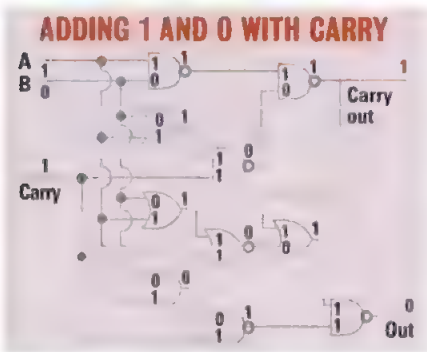


Figure 5: **The intermediate and output values produced when a 1 bit is added to a 0 bit with a carry bit equal to 1.**

three inputs, which are labeled A, B, and CARRY. A and B are the two digits being added together; CARRY is the value carried from the previous column (0 if no carry). The adder has two outputs: OUT and CARRY OUT. OUT is the output digit, and CARRY OUT indicates whether a carry occurred as a result of adding A, B, and CARRY. Figure 4 also shows the adder's truth table. Setting all three inputs to 0 produces output and carry values equal to 0. Similarly, setting any one of the inputs to 1 produces a 1 output and a 0 carry; setting two inputs to 1 produces a 0 output and a 1 carry, and setting all three inputs to 1 produces a 1 output and a 1 carry. If you think about it for a moment, you will realize that this exactly matches the results you get when you add binary digits.

Don't take the truth table in Figure 4 on faith. If you wish, you can verify its accuracy by sketching the logic elements on a piece of paper and computing what the outputs are for various input values. Figure 5 shows the inputs and outputs of each gate when A and CARRY are 1 and B is 0. Knowing the values input to a particular gate, you can use the truth tables in Figure 2 to determine the gate's output. Propagate these outputs throughout the circuit from beginning to end and you will eventually derive the output values for OUT and CARRY OUT. Do it for all eight possible combinations of input values and you'll generate the truth table entirely on your own.

It's but a small step from the 1-bit adder shown in Figure 4 to a 4-bit adder capable of adding larger numbers. A 4-bit adder is merely four 1-bit adders connected together in series, with the CARRY OUT line from the previous adder connected to CARRY on the next. Figure 6 shows what such an arrangement looks like schematically. In order to avoid clutter, each 1-bit adder is now shown as a block with labeled inputs and outputs. Figure 6 also shows the values of the inputs, outputs, and carries when 0111 is added to 0010. The result—1001, which you can see on the four output lines—matches the result obtained earlier when we added the same two numbers by hand.

Engineers can build adders capable of handling any number of digits by stringing together enough 1-bit adders. That's basically how it's done in modern microprocessors, although their adding circuits are much more sophisticated than this. Among other things, they incorporate extra logic permitting several bits to be added simultaneously, which greatly reduces the computation time. Circuits perform subtraction in much the same way as addition, with carry lines becoming borrow lines signifying a "borrow" from the next column.

It's all pretty simple when you view it at this level. When it becomes daunting-

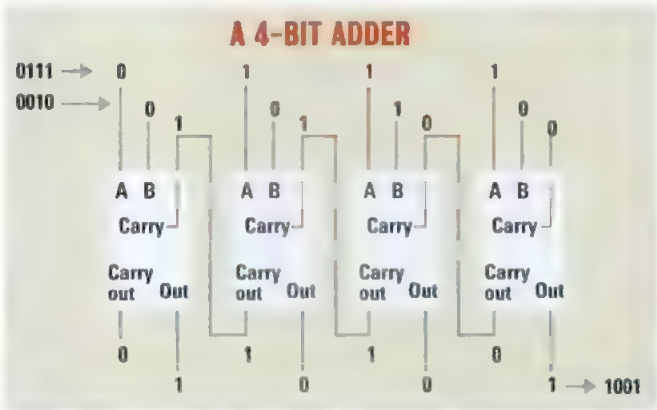


Figure 6: **Four 1-bit adders connected in series to form a 4-bit adder. The outputs shown here are the result of adding 0111 and 0010.**

ly complex is when you think of the millions upon millions of transistors present in a typical microprocessor chip. It's no wonder the world recently learned that the Pentium has a division bug in its floating-point unit. The real wonder is that human error has not introduced major design flaws in microprocessors before now. Or maybe it has, and we just haven't discovered them yet.

But that, dear reader, is a topic for another day.

FURTHER READING If you want to delve deeper into the topic of transistor logic, try the following books: *How Computers Really Work*, by Milind S. Pandit (Osborne McGraw-Hill, 1993; ISBN: 0-07-881936-9); and *Understanding Solid State Electronics*, Fifth Edition, by Don L. Cannon (SAMS Publishing, 1991; ISBN: 0-672-27338-1). □

"IBM only makes servers for huge companies with unlimited budgets."

(Hello, how does starting at $3,000 sound?)

The days when only FORTUNE 500® companies could afford IBM are most definitely over. Because now, for about the price of other brands, any business can choose the IBM PC Server 300 and enjoy what IBM customers have come to expect.

Namely, servers that are easy to upgrade and work perfectly with other computers and peripherals you might already have. Precision IBM reliability. And HelpWare®, a comprehensive service and support package that includes telephone help 24 hours a day, 7 days a week.

What's more, if making your life easier is high on your list of options, you can choose an option of ours—NetFinity™ 2.01 software—which makes managing your network a lot simpler.

For details on how to get the most out of your PC budget by getting the most PC Server, see the IBM Authorized Business Partner near you. Or, for product info by fax, call 1 800 IBM-4FAX and key in ID# 3078 or 3079.

IBM PC Server 300:
486 DX2/66MHz; 728MB hard drive; 8MB parity memory expandable to 128MB; 9 Bays; 8 Open Slots; 30-day money-back guarantee; 3-year, next-day, on-site warranty; EISA/PCI architecture.

There is a difference™ IBM.

PC Direct prices and offerings are subject to change or withdrawal. MB means million bytes. Copies of IBM's Statement of Limited Warranty available by calling 1 800 772-2227. Dealer prices may vary. IBM and HelpWare are registered trademarks and NetFinity and There is a difference are trademarks of International Business Machines Corporation. ©1995 IBM Corporation.

Tech Notes

BY BRIAN PROFFIT

Should Your Computer Go Non-FAT?

In the early days of personal computing, *usability* was not a word associated with operating systems. But in recent years, operating-system enhancements have brought more power to users than ever before, in ways that increasingly shield users from the intricacies of that underlying power. Before you select the Express Installation option that magically moves OS/2 or Microsoft Windows NT onto your computer, though, be warned that what you don't know *can* hurt you. It's worth your time to understand and consider the optional file systems available. In this article we'll look at some of the criteria to consider when selecting a file system. Then, in a future issue, we'll look in more detail at the structure and techniques employed by enhanced file systems.

WHEN FAT WAS GOOD In the early days of personal computing, data was stored on cassette tapes. Tracking space was a matter of writing down the start and end numbers from the recorder's counter when you wrote a file. Allocating space for a new file was simple: You started the recorder in a spot on the tape where there was enough room for the file or risked writing over and losing the next file on the tape.

With the advent of floppy disks, new techniques were possible. Rather than having to fast forward and rewind to find data, floppy disks could move to a given spot nearly instantly. The file allocation table system (usually abbreviated FAT to indicate both the table itself and the name of the file system that implements it) was the means devised to manage the new possibilities that disks brought. FAT is still the file system you'll get during operating system installation unless you specify otherwise.

Disk Partition Size	Allocation Unit	Average Wasted/File
below approx. 16MB*	4,096	2,048
below approx. 128MB	2,048	1,024
below approx. 256MB	4,096	2,048
below approx. 512MB	8,192	4,096
below approx. 1GB	16,384	8,192
below approx. 2GB	32,768	16,384
HPFS - any size	512	256
NTFS - any size	512	256

Figure 1: **This table shows how FAT allocates space on your disk and the average amount of space wasted by each file. Note that while floppy disks are also FAT-based, they always have an allocation unit of 512 bytes (until someone invents floppy disks larger than 32MB).**

SO WHAT'S THE PROBLEM? As the heart of the disk operating system (DOS), FAT has been successfully used by many millions of people over the past 20 years. But remember, FAT was designed in the days when floppy disks were the primary storage device. As fixed disks were created and began growing steadily larger, some of the design decisions made in those early days became less appropriate.

For example, the file allocation table system keeps track of your data using—well, a table. The table is fixed in size, able to track more than 65,000 separate allocation units. Initially, each of those allocation units was 512 bytes. This worked well for years—until disks started growing large. The table's limits meant, unfortunately, that FAT could handle only disks up to 32MB. If you had a larger disk, you had to divide it into separate partitions. Each partition had its own drive letter and FAT, as though it were physically a different disk.

After DOS 3.0, FAT was enhanced to work with larger disks. It was still restricted to a total of 64K allocation units, but the size of those units could grow to cover the entire disk. This technique is still in use today, but it comes at a high price on large disks.

The problem is that, by definition, the allocation unit is the minimum amount of space that can be allocated. So if you create a batch file of only 50 bytes, that file will still take up the entire allocation unit. If the allocation unit is 512 bytes, a file that takes 513 bytes will use two units, or 1,024 bytes. In other words, some files will use as little as 1 byte of the last allocation unit, while others will fill it totally.

On the average, then, half the size of an allocation unit will be wasted by each file. As you can see in Figure 1, that can grow to a massive amount of space. A 510MB disk easily may have 1,500 files on it. Using FAT, 6MB of space is lost just because of the allocation unit size. This is even worse on the currently popular 850MB drives. You easily can have 2,500 files on such a drive, wasting 20MB of space! On multigigabyte network drives, the waste is astronomical.

This is an area where enhanced file systems give you a clear advantage. Simply using the High Performance File System (HPFS) under OS/2 or Windows NT, or NT's own NT File System (NTFS), you can immediately drop back to 512-byte allocation units regardless of the size of your disk partition. To get an idea of the amount of disk space you can reclaim, run CHKDSK. You'll see a report similar to the following:

```
524,058,624 bytes total disk.space
466,944 bytes in 55 hidden files
2,490,368 bytes in 301 directories
391,667,712 bytes in 7,387 user files
129,433,600 bytes available on disk

8,192 bytes in each allocation unit
63,970 total allocation units on disk
```

How Disks Become Fragmented

As you add and delete files and information inside those files, the contents of your hard disk changes constantly. Let's look at how this affects your system.

Below, we see a fresh disk with new files on it. Since FAT always adds new files at the end (whenever possible), the files line up neatly . . . at first.

This is an unfragmented disk.

Root	File 1	File 2	File 3	Unused

After a while, though, you may no longer need some of these files. Suppose you delete the second file. The next file you save may be exactly the same size, but FAT will save the new file at the end of the list, as shown below.

A deleted file leaves an opening.

Root	File 1	Unused	File 3	File 4	Unused

Over time you save more and more information on your disk, so it eventually gets close to being filled, as shown in the diagram below.

New files are added at the end of the list.

Root	File 1	Unused	File 3	File 4	File 5	File 6	Unused

Suppose you remove files 4 and 5 to free up space on your disk. The disk now looks like this:

New deletions leave a large gap.

Root	File 1	Unused	File 3	Unused	File 6	Unused

The next file you want to save is a large one—too big to fit in the unused space at the end of the list. Now FAT switches gears and starts at the beginning of the list to find available space. The area between files 1 and 3 is open, and FAT begins to save your new file there. Since the file is so big, though, it won't all fit in that space. FAT continues saving it in the gap following file 3, creating a layout like the one shown here.

FAT creates a fragmented file.

Root	File 1	File 7A	File 3	File 7B	Unused	File 6	Unused

This is quite convenient. It lets you take advantage of all the space on your disk without worrying about the physical location of files. But it has a disadvantage. When you read or write file 7, there is a delay as the disk head moves from one area to another to get to both parts. The more files on your disk and the more frequently the information in them changes, the more susceptible you are to this fragmentation. This can become a noticeable performance problem as your disk spends more and more time moving the head—time better spent reading or writing data.

And remember that fragmentation doesn't occur just from deleting files. Every time you add a record to a file, the file grows and the allocated space is no longer sufficient. Refer again to the unfragmented disk above: If file 2 expands, it must be moved entirely after file 3 (leaving the gap as if it were deleted) or the new information must be added after file 3, causing fragmentation.

Modern file systems such as the High Performance File System (HPFS) and NT File System (NTFS) are more intelligent in their allocation technique. Look at the last two diagrams: Both systems would realize that file 7 could fit entirely in the space left by the removal of files 4 and 5. Knowing that, HPFS and NTFS would keep it in one piece, as shown below.

NTFS and HPFS take advantage of contiguous space.

Root	File 1	Unused	File 3	File 7	File 6	Unused

```
15,798 available allocation units on
       disk
655,360 total bytes memory
525,152 bytes free
```

Look up the allocation unit size in Figure 1 (or divide by 2) to determine the amount of wasted space per file. In this CHKDSK report the allocation unit is 8,192, so the average loss per file is 4,096 bytes. Because the 512-byte units of HPFS and NTFS also have some loss, subtract 256 from your answer to find the potential savings per file. In this case, 4,096 minus 256 is 3,840 bytes per file you would reclaim (on the average). Now add the number of hidden files, directories, and user files to find the total number of files on the disk: 55+301+7,387=7,743. Multiplying 7,743 files by 3,840 bytes gives 29,733,120—approximately 29 megabytes of disk space that would suddenly become available by changing file systems.

FRAG...PROBLEMS...MENTATION Design decisions weren't just based on the assumption that the drives being managed by FAT were small. Those disks also contained relatively few files. As drives got larger and the number of files on them increased, the files became more susceptible to fragmentation. Since this forces your disk to work harder to access information, fragmentation can become a noticeable drag on system performance (see the sidebar "Why Disks Become Fragmented"). More difficult to measure is how much the extra wear and tear on your disk may shorten its life. One indication of the seriousness of the problem is the number of utilities on the market designed to defragment FAT disks. Since Version 6.0, a DEFRAG utility has even been included in DOS.

OS/2 and Windows NT's enhanced file systems manage data much more intelligently to minimize fragmentation problems, as described in the sidebar. They can't eliminate it altogether, but it is much less significant, and you may never see fragmentation-driven performance penalties. Still, if you're looking

These days, it's not what you know that matters.

It's when you know it.

Introducing Profound,™ the turbocharged online service.

For every key insight contained in the daily avalanche of news articles, reports and statistics, there are at least a thousand time-consuming false trails. Indeed, the single greatest challenge of our so-called Information Age may be getting to the relevant facts while they're still relevant.

But there is at long last a better, faster way to find what you need. A remarkable new product called **Profound** that knows how to locate the needles in your information haystack. Simply pull down a menu, point & click, and Profound's proprietary search system scans millions of reports and news articles. And guides you to the precise information you want in seconds.

OK, Profound's fast. But is it comprehensive?

In fact, Profound offers the most comprehensive business database ever. Log on and you'll discover an extraordinary array of resources, many of which aren't available anywhere else. News from over 4,000 newspapers, periodicals and news wires from Reuters, The Associated Press and others. More than 40,000 full-text research reports from publishers like Frost & Sullivan and FIND/SVP. Hundreds of industry-specific briefings. Financial reports and research on millions of companies from Dun & Bradstreet, Standard & Poor's, Smith Barney and many more. Current prices on stocks and commodities. All accessible through your Windows'-based PC and modem, for only $19.95 a month and enhanced with graphics and Adobe™ Acrobat™ software.

Customize Profound to fit your needs.

As if that wasn't enough, Profound's Custom Alert™ feature automatically keeps you up-to-date on topics of special interest. Simply pick the areas you want to keep tabs on – a client's business, the competition, daily coffee bean production in Colombia. Then every time you log on, a list of the latest and most crucial news articles and research reports will be waiting.

Let Profound prove how valuable instant information can be. FREE.*

Call 1-800-375-6094 and request your free Profound software today. You'll receive your first month's subscription at no charge. Plus five free hours of online time.

profound™

Business Intelligence Online

© 1995 Profound, Inc. ' Windows is a registered trademark of Microsoft Corporation. "Adobe and Acrobat are trademarks of Adobe Systems Incorporated or its subsidiaries and may be registered in certain jurisdictions.
* Includes five free hours (a $34.75 value). Plus Adobe™ Acrobat™ software customized for Profound. The first monthly subscription fee of $19.95 also will be waived. Your five free hours must be used within 30 days of first logging on to Profound. Additional time is $6.95 an hour, based on minutes used.

CIRCLE 257 ON READER SERVICE CARD

Samsung monitors.
Designed from your point of view.

SyncMaster™ 17GLi.

Today's applications demand more from your monitor. That's why Samsung created the GLi Series monitors. They work the way you do.

Performance is only part of the reason to buy a new 17-inch SyncMaster monitor. It has big, bright, crisp, clear images that you can depend on year after year.

Simplicity is also important. The GLi Series offers Plug and Play* compatibility, so you can get right to work. Its intuitive controls and on-screen programming keep concentration where it belongs – on the job.

Plus, Samsung delivers outstanding **Value** – in the comfort of a three-year warranty, and the satisfaction of a competitive price.

If you take your work seriously, think about an exceptional monitor. Think about the SyncMaster 17GLi. After all, it's your point of view.

Call 1-800-933-4110 or use fax-on-demand at 1-800-229-2239 for more information.

SyncMaster	15GLi	17GLi
Flat Square CRT	15"	17"
Dot Pitch	.28	.28
PC Compatibility	1280 x 1024@60Hz	1280 x 1024@60Hz
Mac Compatibility	1024 x 768@75Hz	1024 x 768@75Hz
Color Temperature Selection	•	•
UltraClear Coating™		•
Limited Warranty	3 Years	3 Years

Actual viewable areas are 14.0" (15GLi) and 16.0" (17GLi)

3 YEAR WARRANTY

PLUG & PLAY

© 1995 Samsung Electronics America, Inc. SyncMaster™ and UltraClear Coating™ are trademarks of Samsung Electronics
* When used with Windows 95™ or a Plug and Play operating system conforming to VESA guidelines
Use of the Energy Star logo does not constitute an endorsement

SAMSUNG ELECTRONICS

CIRCLE 046 ON READER SERVICE CARD

Resources

Data Compression Facility/2
Proportional Software, 1717 Linden Lake Rd., Fort Collins, CO 80524; 800-666-4672; outside the U.S., 303-484-2665; fax, 303-484-2670; e-mail, *71333.2765@compuserve.com.*

Diskeeper
Executive Software International Inc., 701 N. Brand Blvd., Glendale, CA 91203-1242; 818-547-2050; fax, 818-545-8801.

GammaTech Utilities for OS/2
Softouch Systems Inc., 1300 S. Meridian, #600, Oklahoma City, OK 73108-1751; 405-947-8080; fax, 405-632-6537.

Graham Utilities
WarpSpeed Computers, P.O. Box 212, Brunswick, VIC 3056, Australia; 61-3-384-1060; fax, 61-3-386-9979; BBS, 61-3-386-3104; e-mail, *100250.1645@compuserve.com.*

for the best performance, it's good to know you can optimize HPFS partitions with WarpSpeed Computer's Graham Utilities for OS/2 or Softouch Systems' GammaTech Utilities for OS/2. Likewise, NTFS users can use Executive Software's Diskeeper utility.

For network administrators trying to manage highly active drives, Diskeeper offers Windows NT users the additional benefit of being able to keep the drive optimized at all times. A utility runs in the background and constantly resolves any new fragmentation problems. It runs at the lowest priority so that it does not affect the performance of your other programs.

Users tight on disk space will be pleased to hear that data compression utilities also are available for the enhanced file systems. Windows NT includes a compression program for NTFS partitions, and Proportional Software offers the Data Compression Facility/2 for HPFS. (See the Resources sidebar for details on these utilities.)

DEALING WITH FILENAME.WOES In the FAT system, filenames can consist of eight characters followed by a three-character extension. When floppy disks typically contained only a dozen files or so, that format provided ample latitude for differentiating the files. But when your file count reaches into the thousands, you can get into increasingly obscure names just to make them unique. Using subdirectories does let you use duplicate names, of course, but remembering what JOHN3148.PLN contains can still be difficult. It's much easier to identify a file named *Johnson house plans subdivision 31 lot 48*. Both HPFS and NTFS allow you to use filenames of up to 254 characters, including spaces for readability. In fact, you can use long names for directories as well, making directory lists much easier to understand. Be cautious, though, if you tend to work from the command line a lot. You'll quickly tire of entering file paths like "\Accounting\Accounts Receivable\Office Products\Fabulous Furniture Inc.AR."

IN SEARCH OF YOUR DATA To access your files, the file system must first locate the correct entry in the directory. Again assuming that the list of files would be short, FAT starts at the top of the directory and reads through the entries one at a time until it finds the desired file. The more files you have in a directory, the longer it can take to canvass this list. Both HPFS and NTFS keep the directory in a sorted b+ tree structure, so they can use more intelligent search techniques to find your file more quickly. A nice side benefit is that the directory list is always in alphabetic order. HPFS takes the additional step of putting directories near the center of the disk so the heads will never have to move more than half the disk width to find a file. Putting all these things together, you'll find that HPFS and NTFS will access your data faster than FAT, particularly on large partitions.

DISASTER RECOVERY Preventing data loss is another goal of the new file systems. If you've used computers for any length of time, chances are you've had a program lock up the system, you've accidentally hit the power switch, or you've had a thunderstorm bring you down. Under such circumstances, it's easy for the file allocation table to become corrupted and no longer match the actual contents of the disk. This can cause some of your data to disappear suddenly. The CHKDSK utility can identify these problems and fix the FAT table, but it can't put the data back the way it was. It creates a series of FILE*xxx*.CHK files that contain the missing data, but unless you're an expert on how your applications store information, those files are useless.

Both OS/2 and NT have beefed up CHKDSK to take advantage of safer storage techniques used by HPFS and NTFS. As a result, there's a far greater chance that CHKDSK will not only detect but actually correct problems that occur in those partitions. These enhanced file systems carry data security one step further by dynamically detecting bad sectors on the disk. If a bad sector is detected, both these file systems can dynamically mark the sector as unusable and transfer the data to a different sector.

PREVENTING UNWANTED ACCESS One of the biggest new features of Windows NT is its security system. But much of the control—the ability to specify users and their levels of access rights to specific files—can take place only on NTFS partitions. The entries in File Manager's Security menu are disabled on FAT and HPFS volumes.

WHY SHOULDN'T I CHANGE NOW? If you're still running old DOS/Windows applications, remember that they expect filenames to follow the 8.3 convention. While OS/2 will let DOS programs access HPFS partitions, and Windows NT lets DOS programs get to both HPFS and NTFS drives, those programs still cannot read directories and files that don't follow the old naming rules. That doesn't prevent you from changing file systems, but it does mean that you should stick to short names in directories that need to be read by old programs.

OS/2 and Windows NT let you leave DOS on your disk and boot either operating system. This is a great way of making the migration to a new operating system a gradual process. But remember that DOS won't be able to see HPFS or NTFS parti-

tions, regardless of the length of the names used. So you may want to keep a FAT partition for DOS programs and data until you're sure everything runs properly on OS/2 or NT. Also, a lot of the extra information that OS/2 and NT keep about files is stored as Extended Attributes in a special area. DOS programs aren't aware of these attributes and will drop them. That includes backup programs, by the way. Make sure you use a backup program specifically designed for OS/2 or Windows NT.

A minor consideration is the amount of memory you have. Enhanced file systems have a lot more work to do, so naturally they require more memory to do it. If your system is already paging heavily, as evidenced by a large swap file, the additional overhead of HPFS or NTFS can actually harm performance slightly. The effect is rather small, though, and outweighed by the increased data reliability.

SO WHAT SHOULD I DO? If you aren't running old DOS/Windows programs, the decision is easy. If you're running only OS/2 programs you should move to HPFS, and if you're using only NT programs you should move to NTFS. While there aren't yet programs of the caliber of The Norton Utilities or Central Point's PC Tools for HPFS and NTFS, there are enough to take care of your basic needs. The first time you see a CHKDSK report that errors were fixed, you'll be glad you did.

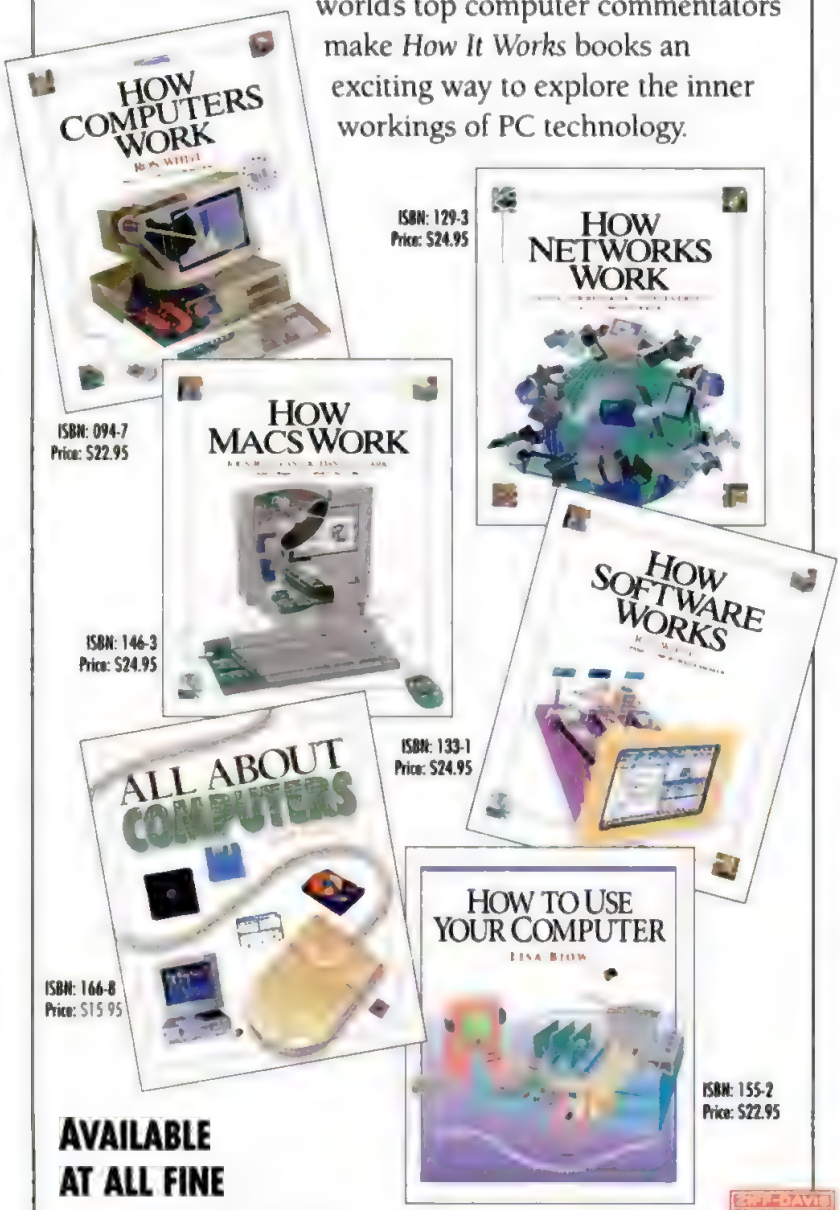
If you are running a mix of program types, the decision may still be easy. As long as you run your old programs only under OS/2 or Windows NT, you can still move to the enhanced file systems. If you want to maintain the ability to boot DOS, though, you need to keep at least one FAT partition.

It's perfectly all right to be conservative and start your change with a small partition for a few weeks to develop a comfort level with the new file system. Chances are, you'll never go back. □

BRIAN PROFFITT IS A SENIOR CONTRIBUTING EDITOR FOR *OS/2 MAGAZINE* AND *OS/2 DEVELOPER*, AND IS THE AUTHOR OF *OS/2 APPLICATION DEVELOPMENT TOOLS* (PREMIER PUBLISHING) AND *OS/2 INSIDE & OUT* (OSBORNE MCGRAW-HILL).

Imagination.
Innovation.
Insight.

No other books bring computer technology to life like the *How It Works* series from Ziff-Davis Press. Lavish, full-color illustrations and lucid text from some of the world's top computer commentators make *How It Works* books an exciting way to explore the inner workings of PC technology.



AVAILABLE AT ALL FINE BOOKSTORES OR CALL 1-800-688-0448, EXT. 8367

ZIFF-DAVIS ZD PRESS

© 1993 Ziff-Davis Press

Why do experts give ATI more awards for its 64-bit Graphics Accelerators than any competitor?

GRAPHICS XPRESSION – the only winner of 54 graphics cards tested
"...stellar graphics performance, affordability."
PC Magazine Editors' Choice, December 6, 1994

ATI's GRAPHICS PRO TURBO
"best combination of features, performance, ease of use and price."
Computer Shopper Best Buy for 1994, January, 1995

GRAPHICS XPRESSION "...outran leading VRAM boards such as Diamond and Matrox..."
PC World Best Buy, September, 1994

Winner in three categories:
GRAPHICS PRO TURBO
Best Overall and High Performance
"...greased-lightning speed..."

GRAPHICS XPRESSION
Low Cost "...the best PCI adapter under $250."
BYTE Best Graphics Accelerator, February, 1995

GRAPHICS XPRESSION
"...rock solid drivers...lets you change resolution and color depth on the fly."
PC Magazine The Best of 1994, January, 1995

GRAPHICS PRO TURBO PCI
"...a top-performing card with good drivers for both AutoCAD and Windows..."
CADalyst Highly Recommended, June, 1994

Could it be ATI's fast performance, high resolution graphics with true color, comprehensive software and drivers, or bargain pricing? It's all of the above. That's why the GRAPHICS XPRESSION and the GRAPHICS PRO TURBO have consistently been the top choices for 64-bit graphics acceleration.

You get razor sharp images up to 1600x1200* resolution and photographic image quality up to 16.7 million colors. Plus "easy on the eyes" display up to 100Hz. **Did we mention that they are really fast?**

And you can significantly increase productivity with ATI's Windows utilities. Features like WinSwitch allow for instant mode switching between color and resolution, *without* leaving Windows. **Did we mention that they are very affordable?**

There's extensive driver support** for Windows, Windows NT, OS/2 WARP, UNIX, DOS, AutoCAD and many others. **Did we mention that we're ready for Windows '95?**

With a full five year warranty, unparalleled customer support, and a price that can't be beat, ATI's award winning graphic accelerators are the right choice. Pick the GRAPHICS XPRESSION or the GRAPHICS PRO TURBO... the experts have.

For more information, contact us at: **Info by Fax: (905) 882-2600 Press 2**
Compuserve: GO ATITECH 76004,3656
Internet: http://www.atitech.ca

OTHER FEATURES

- Built-in motion video acceleration at no additional cost
- Fast DOS and VGA performance
- Easy to install and setup
- Energy efficient Green PC support
- ISA, PCI and VESA Local Bus versions

GRAPHICS XPRESSION

- Value price and performance for the home and business
- Supports up to 16.7 million colors in 800x600, and up to 1280x1024 graphics
- Provides VRAM speeds (at 256 colors) at DRAM prices
- 1MB (upgradeable) or 2MB DRAM

GRAPHICS PRO TURBO

- Ultimate combination of performance and value for the professional graphics user
- Supports up to 16.7 million colors at 1280x1024 and 100Hz refresh rate
- Color calibration software included
- 1600x1200 version (75Hz refresh) available for PCI
- 2MB (upgradeable) or 4MB VRAM

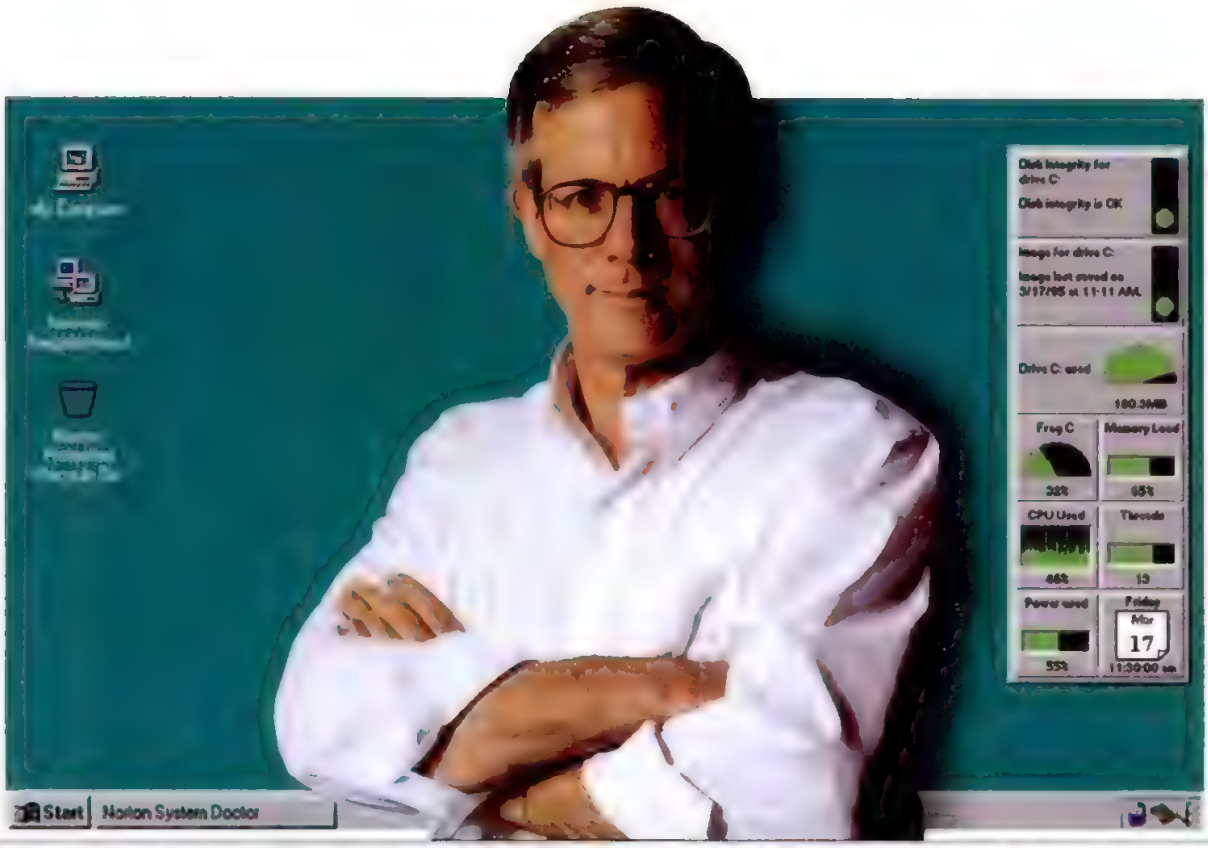
Also available, WINTURBO with 2MB VRAM at $369

ATI TECHNOLOGIES INC.
33 Commerce Valley Drive East
Thornhill Ontario Canada L3T 7N6
Telephone: (905) 882-2600
Facsimile: (905) 882-2620

Perfecting the PC

© ATI Technologies Inc 1995 ATI, *mach64*, GRAPHICS XPRESSION, WINTURBO, GRAPHICS PRO TURBO and WinSwitch are trademarks and/or registered trademarks of ATI Technologies Inc. All other product names are trademarks and/or registered trademarks of their respected manufacturers. The text included has been extracted in part from the original publication. All text is the sole copyright of the publication. Features, prices, and specifications are subject to change without notice.
*GRAPHICS PRO TURBO 1600 only; other products support a maximum of 1280x1024 resolution.
**Driver support may be included with the application or operating system.
All prices are suggested US retail price, dealer may sell for less.

CIRCLE 127 ON READER SERVICE CARD



$30 BUYS YOU THE ONLY 32-BIT UTILITY THAT PROVIDES CONTINUOUS SYSTEM PROTECTION FOR THE WINDOWS 95 PREVIEW PRODUCT.

We wouldn't let you face a new operating system alone. Your old 16-bit utilities won't work in a 32-bit world. So we're offering you the Norton Utilities® Preview designed for the Windows® 95 Preview product.

From a pre-installation tune-up to 32-bit data recovery features, Norton Utilities is designed to ensure that you maximize your experience with the Windows 95 Preview product. By ordering the Norton Utilities Preview for $30, you're entitled to special pricing when the final version of Norton Utilities for Windows 95 is released.

NORTON UTILITIES PREVIEW EDITION

PRE-INSTALLATION TUNE-UP
Frees up disk space and provides a comprehensive pre-installation physical.

NORTON SYSTEM DOCTOR
Continuously monitors all vital resources and data integrity. Alerts you to impending disaster and recommends action or fixes problems automatically.

TRUE 32-BIT NORTON DISK DOCTOR®
Automatically diagnoses and repairs file system problems using the speed and safety of 32-bit technology.

TRUE 32-BIT NORTON SPEED DISK™
Automatically optimizes drives and reduces future fragmentation.

SUPERIOR UNERASE® TECHNOLOGY
100% erased file protection. And the new wizard-like interface that leads you through file recovery step by step.

SYSTEM INFORMATION
Diagnoses potential conflicts and configuration problems with detailed system information and real-world performance testing.

NORTON RESCUE DISK
The intelligent rescue disk provides easy, one-step system restoration by automatically restoring all necessary boot-up files and drivers.

ORDER THE NORTON UTILITIES PREVIEW DESIGNED FOR WINDOWS 95.

This preview offer is available through June 30, 1995. So order today. And get the only 32-bit system protection and data recovery for the Windows 95 Preview product money can buy today.

$30

Norton Utilities Preview. To order, call

1-800-453-1190

Ask for Extension 9163.

Offer expires June 30, 1995. Offer available direct from Symantec only. Price does not include shipping, handling or tax. Allow 4 weeks for delivery.

SYMANTEC.

©1995 Symantec Corp. All rights reserved. Symantec, Norton Utilities, Norton Disk Doctor, and UnErase are registered trademarks and Speed Disk is a trademark of Symantec. All other trademarks or registered trademarks are the property of their respective holders. Offer valid in the U.S. only. In Canada, call 1-800-667-8661, ext. 9513. In Australia, call 008-810-101. In Europe, call 31-71-953111.

CIRCLE 344 ON READER SERVICE CARD

Extending Your Apps

BY BRIAN PROFFIT

Reading Notes Databases—Without Notes

What do you do when you need to access the information in a Lotus Notes database without actually starting Notes? With the right tools there is a way to access Notes databases in your own programs—just as if they were regular data files.

In our issue of January 24, 1995, we examined ways to enhance your Notes applications by attaching an external program to a push button on your Notes forms. We added a push button to a Notes document so you could automatically dial the phone number of a person whose name is contained in the document. It would be even more convenient, though, to develop a general solution that didn't require starting Notes, opening the appropriate database, and then opening the document for that particular person—all just to dial the phone.

In this issue, using Brainstorm Technologies' VB/Link for Lotus Notes and Microsoft's Visual Basic for Windows (or IBM's InterfloX and Watcom's VX-REXX for OS/2 users), we'll build upon that earlier program to create a new utility that reads the Notes database and displays a list of contacts and their phone numbers. You can then select the desired person and dial his number without having to run Notes itself. The code for the programs in the previous and present articles can be downloaded from PC MagNet's Programming forum, archived as DIALER.ZIP.

A NEW VBX CONTROL VB/Link is a set of Visual Basic (VB) functions that allow access to and manipulation of Notes databases through its new NotesData control for VB. The control acts primarily as a focal point for calling methods to read and write Notes data. While most of its functions are strictly for getting Notes data to and from Visual Basic objects, it also contains functions for piping Notes information directly into VB grids or list boxes.

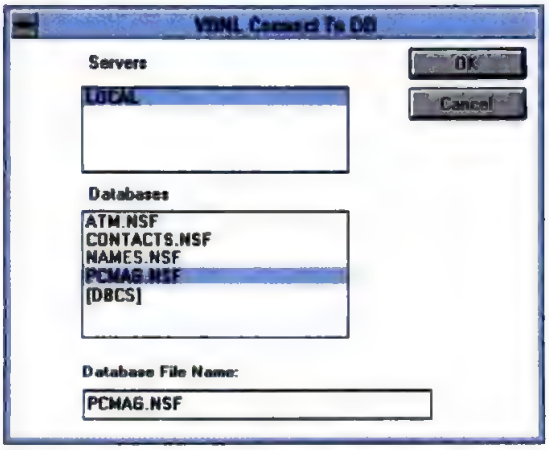


Figure 1: **This is the VB/Link dialog that provides a direct connection to Notes databases.**

So, begin a new project and create a grid nearly as wide as the form, leaving a little space at the top and an inch or so at the bottom of the form. Next, draw a rectangular area to hold the new NotesData control in the lower left corner of the form. Size doesn't matter here, and you should set the Visible property to False.

The control must now be attached to the Notes database. In the Properties dialog, double-click on Database. As you can see from Figure 1, you'll be presented with a dialog very similar to the one Notes itself uses for selecting a database. Double-click on the desired server to get a list of the available databases, and then double-click on the desired database to make the connection. Now specify which form within that database you want to access. Double-click on the Table property, and the drop-down list box at the top of the properties window will allow you to select the specific Notes form you need.

To complete the utility window, add a command push button centered at the bottom of the form and change its caption to "Dial". You'll probably also want to change the caption for the form to something like "Contact Telephone List.". Your form should look similar to the one in Figure 2.

PUTTING MEAT ON THE SKELETON The next step is to attach code to the objects you've just created. Double-click on an empty area of the form to bring up the editor, and then enter—without the line numbers—the following Form_Load procedure :

```
1 Dim ret%
2 NotesData1.Action = ACTION_LOGON
3 NotesData1.Action = ACTION_RUNQUERY
4 ret% = VBNL_PipeNotesToGrid(Notes
  Data1, Grid1, 2)
5 NotesData1.Action = ACTION_CLOSEQUERY
```

The first line declares the variable that will hold return codes. The second and third lines perform methods that VB/Link provides with the NotesData object: Line 2 logs onto the contact database, and line 3 runs a query against the view specified in the Table property. VB/Link mirrors Notes data in *result sets*, which are essentially tables in which each row is a separate document and the columns correspond to the fields in those documents. This correlates well with the VB grid control. The fourth line sends the results of the query directly into the grid you drew, and the fifth closes the connection to the Notes database.

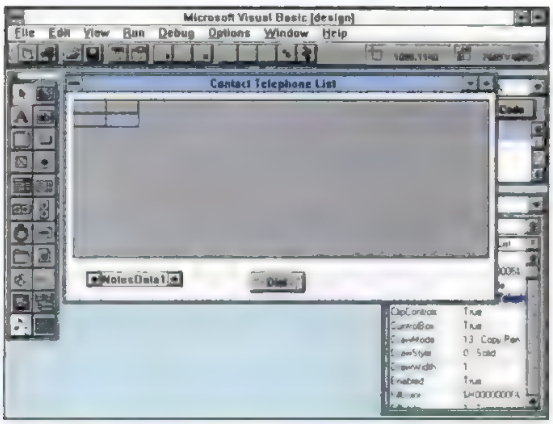


Figure 2: **The NotesData control is on the left side of the phone number selection form.**

Once a user has selected a person, he will click on the Dial command button. For completeness, though, you should put the following line of code in the (default) Grid1.DblClick procedure:

```
call Dial.Click [Repl.
```

to call the button's click routine. This gives a user the choice of simply double-clicking on the contact rather than clicking on the person and then on the Dial button.

The next step is to create that button code. Double-click on the command button to bring up the editor, and enter—without the line numbers—the following Command1_Click procedure:

```
1 Grid1.Row = Grid1.SelStartRow
2 Grid1.Col = 2
3 Phone$ = Grid1.Text
4 Form2.Show 1
```

Since the grid control is a table, the user could select any rectangular area. The first line restricts calling to one number at a time by specifying the first row selected. Line 2 picks the third column (numbering starts with 0) in that row. Note that the user could have clicked on the person's name, but this procedure moves the focus to the contact's phone number. Line 3 extracts the phone number into the variable Phone$. (Yes, I know we haven't declared the variable, but I'll get to that in a moment.) Line 4 causes Visual Basic to display the second form as a modal window.

You don't remember creating a second form? Okay, I cheated a little. Use the form created in the January 25, 1995, Notes extension story. Save it as Form2 in the directory where you're creating this new project. Then add that form to the new project. The window displays the phone number being dialed and prompts the user to press a button when the handset has been picked up so that the modem can be disconnected. To do that, though, you've got to get the phone number to the new form. Variables declared within a form's code are visible only within that form, so you must define Phone$ as a global variable, making it visible to all forms.

From VB's File menu, select New Module. The editor will open a new window for the declarations portion of Module1.BAS. Enter the line

```
Global Phone$
```

Now the phone number can be used by both forms. You'll need to double-click on an empty area of the second form, though, and modify its Load procedure.

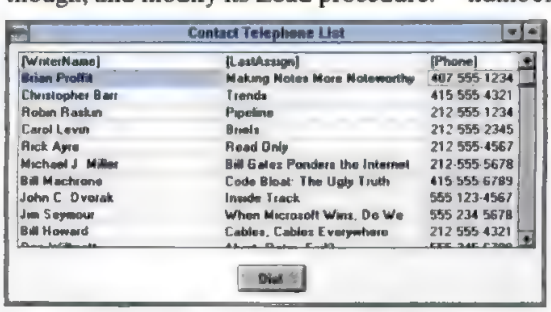


Figure 3: **With a list like this, Windows users can easily dial any contact from a Notes database.**

You must remove the Dim Phone$ line from that procedure. You must also remove the line that extracts the phone number from the command-line arguments, since you're getting it directly this time. The remaining code (to prefix a 1 for long distance and actually to dial the number) works fine as it is.

There is one other change to the second form's code. The previous button-click routine contained an End statement to stop the program after hanging up the modem. Change that line to

```
Unload Form2
```

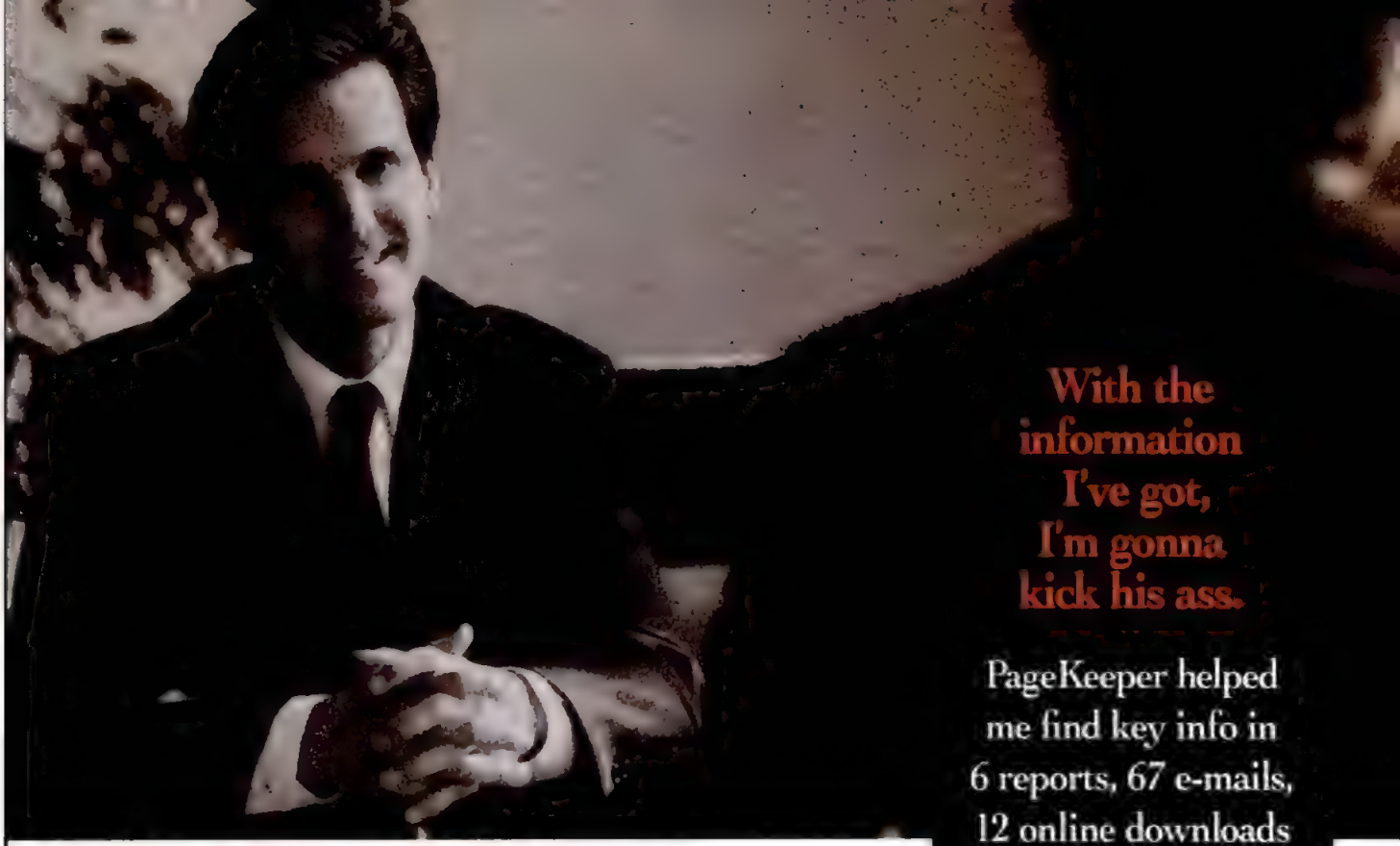
This will close the form and return the user to the contact list. Now save the project and create an .EXE file from it. You can add the new program to your desktop as a standalone contact dialer. Running the program should bring up a display similar to that shown in Figure 3. As you can see, VB/Link inserts the names by which Notes knows the fields into the first row to serve as column headings.

FOR OS/2 USERS TOO The OS/2 world can access Notes databases outside Notes as well, albeit through a slightly more convoluted procedure. IBM made a different design decision when developing InterfloX. Rather than depending upon a graphical development tool (as VB/Link depends on Visual Basic), InterfloX provides Notes access to any REXX program—including those that are totally character based. That is a real advantage for some purposes, but it has a downside as well. Whereas VB/Link provided simple development through a VBX control, InterfloX requires more complex programming to display Notes information. You could use any of a number of popular REXX tools to do the job, but for this particular example I'll be demonstrating with VX-REXX.

Open a new project and narrow the form to roughly a square. Move the pointer to the title bar, and while holding down the Alt key, click the left mouse button. The title bar will become a text-entry field, allowing you to change the window's title to something more meaningful like "Telephone Dialer".

Now create a list box that is nearly the full width of the form and extends down from the top to about an inch from the bottom. Then put in a push button that is centered underneath the list box. Use the Alt-<Left Mouse Button> trick so you can change the text on the button to the word "Dial." Your form should now look similar to the one depicted in Figure 4.

BRINGING IT TO LIFE Double-click on Init from the Section List to open the editor with the code that is executed when



With the information I've got, I'm gonna kick his ass.

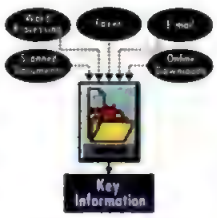
PageKeeper helped me find key info in 6 reports, 67 e-mails, 12 online downloads and dozens of faxes, overnight. So while he's here to ask questions, I've already made all the right decisions.

He's got no chance.

New PageKeeper 2.0 intelligently finds key information hidden in your documents — so you can make critical decisions faster.

$99* To succeed, you've got to be able to make big decisions fast. Analyze a marketing problem. Find key evidence. Plan your next business move. But with all the information hidden in your hard drive among the hundreds of word-processing files, faxes, e-mails, online downloads, scanned documents and so on, it's hard to get at the key facts fast. ■ PageKeeper makes it easy. It's an information bloodhound for today's intense, decision-driven world. ■ PageKeeper actually reads and understands the contents of your files. With exclusive SmartFind™ you ask for what you want, in your own words, and PageKeeper makes a lightning-fast, in-depth analysis of your hard drive. It instantly returns with a color-coded list of documents, ranked by the relevance of the information they contain. It's much faster than conducting a painstaking, file-to-file search yourself. ■ PageKeeper works seamlessly with most Windows™ applications. So, you can easily perform searches or store information without switching from program to program. And it also has Caere's award-winning OmniPage® OCR (optical character recognition) technology built in. ■ Here's a decision that's easy to make. Get PageKeeper at an introductory price of just **$99:** Call **1-800-224-0660, ext. 625** today for your local software retailer, or for more information.

Get prioritized search results in seconds. PageKeeper even finds related information you never thought to ask for.



SmartFind searches most common file types for relevant information.

PageKeeper effortlessly retrieves information from virtually any source.

caere

*Limited time offer. PageKeeper has Caere's 60-day, money-back guarantee! Caere, the Caere logo, PageKeeper and OmniPage are registered trademarks of Caere Corporation. SmartFind is a trademark of Caere Corporation. All other registered trademarks and trademarks are property of their respective companies. ©1995 Caere Corporation. All rights reserved.

CIRCLE 245 ON READER SERVICE CARD

Can *YOUR* graphics board do all this for only $369?

Matrox MGA can!

That's why it won PC Computing's 1994 MVP award. The MGA Impression series combines the industry's fastest 64-bit VRAM technology with hardware accelerated Windows, video and 3D. And for only $369!

But MGA gives you more than just raw processing speed. MGA lets you view your entire spreadsheet, document imaging or desktop publishing application all at once at an incredible 1600 x 1200 resolution. Your photographs and graphics designs will fly onto your screen in 16.7 million colors - even at 1280 x 1024 resolution. And your screen will refresh at a rock-solid, flicker-free 120 Hz.

MGA is also your ticket into the future of video and 3D graphics. You can play back full-screen Video for Windows clips at a smooth 30 frames per second, and add up to 15 VM-based peripherals such as a frame capture board or MPEG card. And because MGA accelerates 3D directly in hardware, you can interactively manipulate your complex 3D CAD models and animations in real-time.

And if that wasn't enough, MGA also comes with over 20 Windows and CAD productivity enhancing features, and state-of-the-art, arcade quality 3D games created specifically to take advantage of MGA's advanced 3D polygon engine.

Oh, and did we mention that MGA has won over 35 international awards? Now what more could you ask for from a graphics accelerator!

- 43 million *honest* Winmarks[1]
- Support for Windows 3.1, Windows NT and OS/2
- Drivers for AutoCAD, Microstation and 3D Studio
- DCI software and hardware[2] video acceleration
- Free MGA 3D-SuperPack game bundle
- Over 20 productivity features including Instant ModeSWITCH™ for on-the-fly resolution and color depth switching without restarting Windows, and much, much more!

MGA Impression Lite
$369 PCI, $399 VLB
2 MB VRAM Non-Upgradeable

MGA Impression Plus
$449 PCI, $499 ISA
2 MB VRAM Upgradeable to 4 MB

MGA Impression Plus $599 PCI
4 MB VRAM

1-800-583-3393
MATFAX: (514) 685-0174

Matrox Graphics Inc.
Tel: (514) 685-2630 Fax: (514) 685-2853

1 - WinBench 4.0 score based on in-house testing of a 2 MB MGA Impression Plus [illegible]

2 - Hardware acceleration only available with MGA Impression Plus

© 1994 All rights reserved Matrox. Matrox MGA, Matrox QDP, Matrox Instant ModeSwitch are registered trademarks of Matrox Electronic Systems Ltd.

matrox

PC Computing MVP Winner

"It's the MGA Impression Plus' combination of sophistication and down-to-earth street price that wins it our MVP Award this year."
PC Computing, Dec. 1994, p. 140

See Us At
COMDEX/Spring
Booth: #6946

CIRCLE 124 ON READER SERVICE CARD

the program is initialized. Move the cursor to the line below

```
call VRSet window, "Visible", 1
```

and enter—again, without the line numbers—the instructions listed in Figure 5.

The first line in Figure 5 simply initializes the Notes/InterfloX environment. The second line opens the specific Notes database you'll be working with and returns a database ID—a handle by which to access that database.

Actually accessing the contents of that database is an indirect process. Rather than simply reading through the documents serially, you must specifically request them using a document ID. Line 3 conducts a search of the database, selecting only those documents that represent the form in which you're interested. In addition to your data documents, the access control list used to determine who can read or change the information is also stored in document form in the database itself. So are the instructions on the views that are available. Line 3 extracts only our specific form type and creates a new compound variable (*writer* in this instance) that contains the document IDs that reference those documents. InterfloX follows the REXX standard of using element 0 of a compound variable to contain the total number of elements in the array.

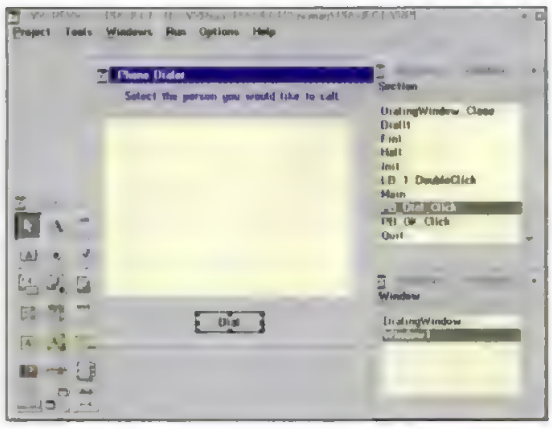


Figure 4: **This is the phone-dialer form used when working with VX-REXX.**

Line 4 begins a loop that steps through the document ID array and uses those handles to read the specific documents that they represent. Line 5 performs that read and puts all of the contents of the current document into a new compound variable called *docinfo*. The structure of this variable is described in Figure 6.

Having loaded the document, we now need to look through it for the name and phone information. Line 6 begins a loop through the fields found in the document whose layout is described in Figure 6. I use this technique rather than specifying field numbers, because forms change all the time. By looking for specific field names in lines 7 and 8, the program will continue to work even if new fields are added, removed, or inserted later. The only assumption the program makes is that a contact's name appears before his phone number on the form.

Line 7 finds the contact's name and stores it for later usage. Line 8 detects that the current field is the phone number and exits the loop. Line 10 puts an entry in the list box consisting of the name we saved, a dash (a separator), and the value of the current field (the phone number). Finally, line 12 closes the Notes database and line 13 terminates the Notes/InterfloX connection.

MAKING THE CALL We now need to process the phone number the user selects when the Dial button is pressed. Click on Dial with the right mouse button, and select Click from the Event menu. This brings up the editor to allow us to enter instructions for the PB_1_Click event. Enter the following instructions, again omitting the line numbers shown:

```
1 call VRMethod 'LB_1',
  'GetSelectedStringList', 'person.'
2 parse var person.1 . '-' phone
3 call DialIt phone
```

Line 1 determines which entry the user picked and puts it into the variable *person*. Line 2 then parses that entry, using the dash we inserted as the delimiter that indicates the start of the phone number. Line 3 calls the DialIt procedure, passing it the phone number that we want to call.

At this point, we must again cheat as we did with the Visual Basic version and use the window and program that we created in the earlier article to display the phone number and make the call. Copy that window as Window2 and, since it is no longer the primary window, rename the Window1_Create routine DialIt. Only a couple of small changes are needed. Window1_Create was written to take the phone number from the command line. We now want it to take the num-

```
 1 call LtsNotes 'NOTESINIT', 'QUIET'
 2 call LtsNotes 'DatabaseOpen','E:\NOTES\PCMAG.NSF','db_ID'
 3 call LtsNotes 'DatabaseSearch', db_ID, 'writer', 'Select FORM = "Writer Info"'
 4 do ThisDoc = 1 to writer.0
 5   call LtsNotes 'DocRead', db_ID, writer.ThisDoc, 'docinfo'
 6   do Field = 0 to docinfo.2.0
 7     if docinfo.2.Field.1 = 'WriterName' then Person = docinfo.2.Field.3
 8     if docinfo.2.Field.1 = 'Phone' then Leave
 9     end
10   call VRMethod 'LB_1', 'AddString', Person '-' docinfo.2.Field.3
11   end
12 call LtsNotes 'databaseclose',db_ID
13 call LtsNotes 'notesterm'
```

Figure 5: **Here is the code to enter when creating the OS/2 version of the telephone dialer.**

```
Layout of the document information compound variable

Stem.1  Document ID
Stem.2.0  Number of fields (x) in this document
  Stem.2.x.1  Name of field x
  Stem.2.x.2  Data type (number, text, rich text, etc.)
  Stem.2.x.3  Field value
  Stem.2.x.4  Field options (protected, encrypted, name, signature, etc.)
  Stem.2.x.5  Field update command (used by DocWrite to update, add, or delete a field)
Stem.3  Date last modified
Stem.4  Document Class (Access control list, form, data, etc.)
Stem.5.y Document yes/no for privilege level y (y=1 to 5)
Stem.6  Unused
Stem.7  Origination ID information, used to control replication
```

Figure 6: **This is the layout of the *docinfo* compound variable.**

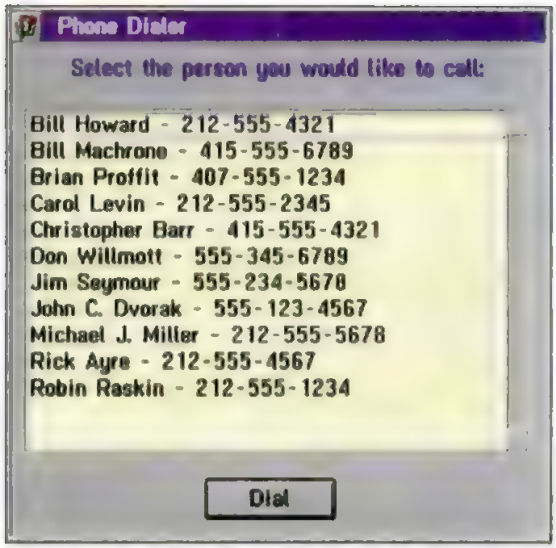


Figure 7: **This is the phone dialer produced under VX-REXX.**

ber as an argument, so change the line

```
Phone = Strip(InitArgs.1,, "'")
```

to read

```
Phone = Arg(1)
```

Also, since this is no longer the primary window, we need to load it manually with the instruction

```
DialWindow =
 VRLoad(VRWindow(),
 VRWindowPath(), Window2)
```

As in the Visual Basic version, we need to change the action taken when the user picks up the handset. Rather than ending the program, we want to close that window to return to the contact list, so replace the END instruction with

```
call VRDestroy DialWindow
```

The last bit of cleanup is to allow the user to double-click on a contact rather than clicking on the person and then the Dial button. Click on the list box with the right mouse button and select the DoubleClick event. Enter the following instruction:

```
Call PB_1_Click
```

The program will then handle double-clicks automatically. Save your project, create an executable, and directly attached to your Notes database you will now have the new automatic phone dialer shown in Figure 7.

ONLY THE BEGINNING Both VB/Link and InterfloX allow much more complex manipulation of Notes databases than I've demonstrated in this column. One reason people limit their use of Lotus Notes is that the data isn't sufficiently accessible outside Notes, as it would be when using a more traditional database. As you can see, however, the right tool can open up your Notes information to as many manipulations as you can imagine. □

BRIAN PROFFIT IS A SENIOR CONTRIBUTING EDITOR FOR *OS/2 MAGAZINE* AND *OS/2 DEVELOPER*, AND IS THE AUTHOR OF *OS/2 APPLICATION DEVELOPMENT TOOLS* (PREMIER PUBLISHING) *AND OS/2 INSIDE & OUT* (OSBORNE MCGRAW-HILL).

MOVING?

Please write to: PC Magazine, P.O. Box 54093, Boulder, CO 80322. Include your mailing label from a recent issue of PC Magazine for faster service. Please allow up to 60 days for change of address to take place.

When we tell you there is no more compatible, reliable, affordable modem on the market than AT&T's new DataPort Express 28.8 you can trust us.

After all, we invented the things.

Access the Globe.

DataPort Express 28.8 Kbps fax modem

Our new DataPort Express 28.8 Kbps modem is so trustworthy you'd think it was Reuters' first. It's backed by AT&T tried and true quality with year toll-free technical support and a 5-year warranty. With throughput at speeds of 115,200 bps* using V.42bis for data compression and error correction, you save on connect time and phone costs. And get fast, easy reliable access to the Internet. Plus just to stay on your good side, we'll throw in hundreds of dollars in free on-line services and software. The DataPort Express modem, available in 288 or 144 Kbps models, from AT&T. Only from AT&T. The world's leading provider of network access products and technologies.

Call 800 482-3333, ext. 757 for your free interactive product disk. You could win a trip anywhere in the world with our Access the Globe sweepstakes.** Or call for information on the dealer nearest you.

AT&T

COMPUSA

Fry's

CIRCLE 233 END USERS ON READER SERVICE CARD

CIRCLE 309 RESELLERS ON READER SERVICE CARD

©1995 AT&T. DataPort is a registered trademark of AT&T. All other products or services mentioned are trademarks, service marks, registered trademarks or registered service marks of their respective owners. *The speed you achieve will be affected by your computer systems, communications software and the compressability of data being transferred. **Prices may vary by dealer/store location. †Total value up to $10,000. Interactive catalog and game available until 5/31/95 or while supplies last. No purchase necessary. Void where prohibited. Open only to U.S. residents who, as of 2/12/95, are 21 years of age or older and are owners/users of personal computers, with the exception of AT&T employees and their families. Complete rules. By which all entrants are bound, contained on response disk. Limit one response disk per person. Sweepstakes ends and all prizes must be claimed by 7/31/95.

THE COMPAQ CONTURA 410C.

Intelligently Designed. Sensibly Priced.

Add desktop convenience to your Contura 410C with the optional Docking Base. Features a battery charger and optional Ethernet.

In the world of tray tables, hotel rooms and waiting areas, the design of your notebook matters as much as the processor and RAM. So we gave the Compaq® Contura® 410C smart, road-ready features like a detachable carrying handle, a vibrant color display, a big, comfortable center-mounted trackball and a tilting full-function keyboard. You also get two PCMCIA slots, a 350MB hard drive and a new wall-mount AC adapter. Yet we kept the weight under six pounds. Of course, we also made the Contura 410C highly affordable, so that it fits your budget every bit as comfortably as it fits your hands. So why not call and order yours today?

COMPAQ CONTURA 410C
$2,499
OR $90 PER MONTH*

CONTURA 410C OPTION PAQ™
- ADDITIONAL 4MB RAM
- ADDITIONAL ENHANCED NiMH BATTERY PACK
- COMPAQ 192 PCMCIA FAX MODEM
- KENSINGTON EXECUTIVE TRAVELING CASE

ADD $589

CONTURA 410C FEATURES:
- 486DX2/50MHz PROCESSOR
- 4MB RAM (UPGRADABLE TO 20MB)
- 350MB HARD DRIVE
- TWO PCMCIA TYPE II SLOTS (OR ONE TYPE III)
- 3.5" DISKETTE DRIVE
- 9.5" COLOR DUAL SCAN DISPLAY
- LOCAL BUS GRAPHICS
- INTEGRATED TRACKBALL
- TILTING, FULL-FUNCTION KEYBOARD
- WALL-MOUNT AC ADAPTER
- ENHANCED NiMH BATTERY
- 11.9" x 8.9" x 2½; 5.9 POUNDS
- MULTILOCK SECURITY FEATURES
- PREINSTALLED MS-DOS® 6, MS-WINDOWS® 3.1, TABWORKS® AND LOTUS ORGANIZER
- 3-YEAR WORLDWIDE WARRANTY†

COMPAQ DirectPlus

1-800-888-3180
WEEKDAYS 7-7, SAT. 9-3 CST

ASK FOR OUR LATEST FREE CATALOG.

*Leasing is provided by GE Capital Services for a term of 36 months, and is subject to approved credit and certain terms and conditions. †Restrictions and exclusions apply. Compaq Contura 410C is covered by a Three-Year Worldwide Limited Warranty. Monitors, battery packs and certain options are covered by a One-Year Warranty. ©1995 Compaq Computer Corporation. All rights reserved. Compaq and the Compaq Logo Registered U.S. Patent and Trademark Office. DirectPlus is a registered service mark and Option Paq is a service mark of Compaq Computer Corporation. Contura is a registered trademark of Compaq Computer Corporation. Products, prices and programs are subject to change without notice. Other products are trademarks or registered trademarks of their respective companies. Microsoft, MS-DOS and Windows are registered trademarks of Microsoft Corporation. TabWorks is a registered trademark of Xerox Corporation. Offer available in the U.S. only.

Toolkits

BY BOB FLANDERS

Automate Your Software Testing

Software testing—that repeating cycle of setting field values, checking boxes, clicking buttons, and checking results—is hugely tedious. Fixes to one part of the program may break another, so everything must be retested after a fix. Oversights can easily occur, letting bugs slip by undetected.

SQA TeamTest, Version 3.0 ($2,495), relieves testing drudgery and prevents oversights by automating every step of the process. Designed for Microsoft Windows–based programs, TeamTest overcomes the problems in testing graphical interfaces with an object-oriented approach that can identify buttons and windows even when they are repositioned.

INTEGRATED COMPONENTS TeamTest has two main components: SQA Manager and SQA Robot. SQA Manager lets you organize test plans with a tree display. The first level includes broad goals such as "Test Database Interface." Subrequirements beneath this might include "Add New Record" and "Delete a Record." Test procedures can be associated with test requirements, and all information is stored in the Test Repository.

You can generate test procedures automatically with SQA Robot, a macro recorder that is linked to SQA Manager through the Test Repository. If you've given names to your test procedures in SQA Manager, you can select them in SQA Robot. But you don't need to use SQA Manager to plan your tests; you can create and name procedures on the fly within SQA Robot, and these also will be stored in the Test Repository. The procedures generated by SQA Robot are written in Microsoft Visual Basic, rather than in a proprietary scripting language.

OBJECT-ORIENTED One of the challenges of automated testing of Windows programs is identifying objects on the screen. This is difficult because objects can't be reliably identified by location. A related problem is recording mouse actions for use in the script. You want to record meaningful mouse movements and ignore extraneous ones.

TeamTest solves both problems with its object-oriented approach. Buttons, for example, can be identified by the text on the button, by index (for example, the third button in the window), or by Windows ID. If you are testing applications written with Gupta SQLWindows, Microsoft Visual Basic, or PowerBuilder applications, you can identify objects by their internal name—an error-free method that is independent of the object's physical features. Only mouse movements that act upon objects are recorded; all other mouse activity is ignored.

Each test procedure is associated with a test case that describes the correct outcome. There are 19 predefined tests, such as matching bitmaps or checking list contents. You can also create user-defined tests that use external program functions for additional conditions.

You test programs within SQA Robot by replaying the test procedures. During replay, SQA Robot notes in the Test Repository any variances between expected outcomes and what actually occurs. You view the results through SQA Manager, which lists every test performed, the date it was performed, and whether it passed or failed. You can click on a specific test for more information. In addition to on-screen viewing, SQA Manager can create customizable, printed test reports.

TeamTest works only with Windows programs (both single- and multiuser). You cannot test DOS programs, even in a DOS box, and you cannot check low-level activity such as data to and from a serial port unless that data is displayed in a window. TeamTest's strength is in testing the performance of Windows programs that operate mainly through a graphical user interface, and it does this very well.

▶ **SQA TeamTest, Version 3.0.** List price: *$2,495 per station.* Requires: *386-based PC or better (486-based PC or better recommended), 8MB RAM, 18MB hard disk space, Microsoft Windows 3.1 or later.* SQA Inc., *10 State Street, Woburn, MA 01801; 800-228-9922; fax, 617-932-3280.*

Circle 453 on reader service card

OFF THE STACK

• **ISDN*tek** has released the WinISDN SDK ($199) for developing Windows-based applications that use ISDN cards to communicate over reliable, high-speed ISDN phone lines. ISDN cards can be used for remote access (including Internet access), file transfer, image transfer, and voice capture. The package includes the WinISDN.DLL driver, sample routines in Visual Basic for dialing and voice capture, and documentation for the WinISDN API. *ISDN*tek; 415-712-3000; fax, 415-712-3003.*

Circle 454 on reader service card

• **Raindrop Software's** Open Mail System (OMS) eases development of e-mail applications by simplifying tasks such as logging on, sending mail, checking incoming mail, sending documents, listing users, and logging off. OMS supports the three most common e-mail protocols—VIM, MAPI, and MHS—used by cc:Mail, daVinci, Lotus Notes, Microsoft Mail, and others. The Visual Basic version (OMS/VBX) retails for $495; the C/C++ libraries retail for $995. Source code pricing is determined on an individual basis. *Raindrop Software; 214-234-2611; fax, 214-234-2674.*

Circle 455 on reader service card

WHAT HAPPENS

WHEN YOU ADD SIZE

TO AN ALREADY

EXTRAORDINARY PACKAGE?

MXP17F

PC WORLD

April 1995

WHAT DO YOU THINK?

At 7 feet 2 inches tall, Kareem Abdul-Jabbar has got some serious size. But that's only half the story. The fact that he added superior basketball skills to an already imposing frame is what made him a dominant force in the NBA for two solid decades.

The new ergonomically and aesthetically designed Elite series of monitors from MAG InnoVision have features that other monitors just can't touch. And the fact that they only come in the larger 15-inch, 17-inch and 21-inch sizes with the most advanced CRT technologies makes them truly fantastic. Advance Display Calibration, Green Energy and LCD displays combined with ultra high resolutions up to 1600 x 1280, lightening-quick refresh rates and crystal clear dot pitches make them impossible to beat. And since they're so reliable, we'll even throw in a 3-year limited warranty.

So pick one up at a MAG InnoVision dealer near you. Their larger size and imposing features are liable to dominate the market for years to come and they cost a lot less than, say, an NBA draft pick these days.

MAG INNOVISION

2801 South Yale Street • Santa Ana, California 92704 • 800-827-3998 • 714-751-2008

CIRCLE 253 ON READER SERVICE CARD

Power Programming

BY RAY DUNCAN

Setting Up a Web Server

A century or so from now, observers looking back on the 1990s will consider the advent of the Internet and the World-Wide Web one of the great watersheds of history—comparable technologically to the invention of movable type, artistically to the Renaissance, and socially to the Declaration of Independence. You may think this assessment grandiose, but look around you: The great on-line body of individually authored and hyperlinked information that Ted Nelson envisioned decades ago as the Xanadu project is day by day crystallizing before our eyes. Tens of thousands of creative network citizens across the world are setting up their own information servers and joining the Web. In the process, those net citizens are completely bypassing the Establishment with its bureaucracies, class hierarchies, and power structures, not to mention the entire monolithic apparatus of the traditional publishing industry!

But the World-Wide Web has its more mundane applications as well. In the medical center where I work, we have been looking for several years at the concept of electronically publishing information to be used within and without the hospital. Until a year ago, the difficulties involved in such an undertaking seemed almost insuperable. One factor was the diversity of the information itself, which ranged from simple phone directories to highly technical policies and procedures to graphical entities such as maps, pictures, and X-ray images. Secondly, many types of computers and operating systems would somehow need to be supplied with viewer software, which had to be disseminated to potential users both inside and outside the hospital and then kept up to date. The users' varying levels of computer expertise, literacy, and adaptability also had to be taken into account.

When the World-Wide Web exploded out of nowhere in 1994 to become the preferred vehicle for information publishing on the Internet (and the darling of journalists, hackers, academicians, and even the White House), we soon realized that the Web was the answer to our internal electronic-publishing dilemma. Web servers and browsers handle text and graphics with equal facility. The browsers are user-friendly and can overcome the computer phobia of even the most backward physicians and administrators. Servers and browsers are available for every important type of CPU and operating system. And best of all, the essential software is all free or can be licensed at nominal cost! The medical center is now rapidly standardizing on the Web as the enabling technology for the dissemination of every type of information to its employees, contractors, business partners, and clients. And you can do the same in your organization.

The World-Wide Web exploded out of nowhere in 1994 to become the preferred vehicle for information publishing on the Internet.

One aspect of Web browser software that has rarely been brought out—in spite of countless articles in the trade press—is that it is not really network-dependent in any way. Of course, the most common use of Web browsers is to retrieve text and graphics across a network connection from a Web server at a remote site, but the material can just as easily reside on the same machine as the browser. In fact, a Web browser can be used as a stand-alone viewer for compilations of articles and graphics or "flattened databases" much as we have discussed the use of the WinHelp viewer in the past. In one case that I am aware of, a group of biologists distributed an entire CD-ROM full of specialized data with an assortment of Web browsers. In this way, they bypassed any need to pay royalties on viewer software and achieved a level of cross-platform compatibility that would have been completely unthinkable just a year ago.

In my last column (*PC Magazine*, April 11, 1995), I provided you with a fairly cosmic overview of World-Wide Web terminology and server implementation issues. In this installment, we'll look a little more closely at the process of setting up your own Web server and introduce you to document formatting for the Web.

GETTING STARTED The first step in setting up a Web server is to decide which hardware platform and operating system to use. Web server software is available for all the common varieties of personal computers and workstations, so your decision can be based on economics, convenience, and compatibility with the existing machines on your local area network. It's important to note, though, that you don't need a high-end computer for a Web server. The Web server's function is simply to store and ship files, so network speeds are a much more important constraint on the Web server's performance than CPU power. It's a good idea, however, to start out with a relatively large hard disk; I recommend at least 1GB. This way you won't be forced to endure the hassle and downtime of a hard disk upgrade for at least a year or two.

The second, crucial step is to arrange for TCP/IP connectivity for your machine. This means that your machine must be connected to the network with a network interface card and the appropriate low-level network drivers. In addition, a

HTML COMMANDS

Structural Commands

<HTML> ... </HTML>
Delimits the beginning and end of an HTML document.

<HEAD> ... </HEAD>
Delimits the beginning and end of the "head" portion of an HTML document.

<BODY> ... </BODY>
Delimits the beginning and end of the "body" portion of an HTML document.

<TITLE> ... </TITLE>
Delimits the "title" string for an HTML document. These tags must occur within the "head" section.

<ADDRESS> ... </ADDRESS>
Delimits the "address" text for an HTML document. These tags must occur within the "body" section. By convention, they are used to frame the name of the document author, an e-mail address, and the date of the last modification.

Paragraph-Formatting Commands

<P>
Indicates the end of a paragraph and thus the end of a block of text that can be "reflowed" with automatic line wrapping. The paragraph is separated from the following paragraph by approximately one line's worth of white space. No </P> tag is in the current versions of HTML.

Forces a line break (a "hard return"). The line is not followed by any extra white space. No </BR> tag is in the current versions of HTML.

<H1> ... </H1>
Delimits a "level one" heading. All headings are separated from the surrounding text by approximately one line's worth of white space in the font size used for the heading. <H1> headings are larger than <H2> headings, and so on.

<H2> ... </H2>
Delimits a "level two" heading.

<H3> ... </H3>
Delimits a "level three" heading.

<H4> ... </H5>
Delimits a "level four" heading.

<H5> ... </H5>
Delimits a "level five" heading.

<H6> ... </H6>
Delimits a "level six" heading.

<PRE> ... </PRE>
Delimits text that is to be displayed in a nonproportional font with all spacing intact and without automatic line wrap.

<BLOCKQUOTE> ... </BLOCKQUOTE>
Delimits text to be treated as a quotation. Typically indented by the visual equivalent of "one tab stop" and separated from the preceding and following paragraphs by an arbitrary amount of white space.

<LISTING> ... </LISTING>
Delimits text to be displayed as program listing.

Character-Formatting Commands

<B> ... </B>
Physical style: Boldface.

<I> ... </I>
Physical style: Italic.

<U> ... </U>
Physical style: Underline.

<TT> ... </TT>
Physical style: Typewriter (nonproportional) text.

<EM> ... </EM>
Logical style: Emphasis (often rendered as italic).

<STRONG> ... </STRONG>
Logical style: Strong emphasis (often rendered as boldface).

<CODE> ... </CODE>
Logical style: Used for HTML directives.

<SAMP> ... </SAMP>
Logical style: Sample output of a user command.

<KBD> ... </KBD>
Logical style: Keyboard character.

<VAR> ... </VAR>
Logical style: Program variable.

<DFN> ... </DFN>
Logical style: Definition.

<CITE> ... </CITE>
Logical style: Citation.

List Commands

<UL> ... </UL>
Delimits an unordered (bulleted) list.

<OL> ... </OL>
Delimits an ordered (numbered) list.

<LI>
Indicates the start of an item within an ordered or unordered list. No </LI> tag is in the current versions of HTML.

<DL> ... </DL>
Delimits a "definition" list, composed of a variable number of alternating "terms" and "definitions."

<DT>
Indicates the start of a "term" within a definition list.

<DD>
Indicates the start of a "definition" within a definition list.

Anchor Commands

<A HREF="...."> ... </A>
Declares a hyperlink. The text within the quotation marks is the Universal Resource Locator (URL) of a target document, a relative path to a document, or a label within the current document. The text between the tags constitutes the hyperlink that is seen by the user; it is typically displayed in color and/or with a special attribute such as underlining. When the user clicks on the displayed text, the browser retrieves the target document (or scrolls to the label, if in the current document) and displays it.

<A NAME="..."> ... </A>
Declares a label within a document that can be used as the target of a hyperlink. The text within the quotes is the label and is invisible to the user. The text between the tags is displayed to the user without special formatting.

***Figure 1:* These are the basic HTML text-formatting commands by category. Additional text-related tags exist but are rarely used.**

TCP/IP protocol software stack must be installed on your machine. The TCP/IP software must be configured with your machine's IP number and the IP numbers of your network gateway machines and DNS servers. Any routers on your network may need to have their filtering tables updated so that TCP/IP traffic from your machine will pass through the routers and ultimately to the Internet. Finally, you must update the DNS servers for your network domain with the name, Ethernet ID, and IP number of your machine.

Installing and procuring the TCP/IP stack are quite different for each platform. Unix workstations include TCP/IP support as a matter of course—it's part of the definition of a workstation. The TCP/IP stack on Unix systems is configured by cryptic text files that are scattered all over the boot volume, but the default configuration usually works fine. Microsoft Windows NT includes a TCP/IP protocol stack, but the setup program does not install it automatically; you must refer to the on-line help to install and configure TCP/IP as a separate step after the system is running. Configuration is carried out by a standard Windows NT Control Panel applet and is quite straightforward if you understand the terminology.

OS/2, Version 3.0, includes TCP/IP support, and the configuration process is

relatively trouble-free. Macintosh System 7.5 includes the Apple TCP/IP protocol stack (called MacTCP), but the configuration process is uncharacteristically obscure until you have done it a few times. Earlier versions of Macintosh System do not include MacTCP, but a licensed copy is bundled with virtually every Macintosh communications or TCP/IP utility product, and it can also be purchased separately for a nominal fee..Microsoft Windows 3.1 users must resort to public-domain implementations or purchase one of the several expensive third-party Windows TCP/IP packages.

The network connectivity and TCP/IP issues are pretty exotic from a software developer's point of view, so you will need to work closely with your company's network support staff and/or your Internet services provider to get everything properly set up. Those worthy folk must allocate an IP number and machine name for your machine and update the routers and DNS servers anyway, and it's a smart move to take advantage of their experience and expertise rather than trying to figure out how to do everything yourself. Believe me, you don't want to get entangled in the arcane details of network management and infrastructure—life is too short!

The third step is to get your hands on the actual Web server software for your machine type and operating system. This is most easily accomplished via the Web itself. Obtain and install a Web browser (such as Cello, Mosaic, or Netscape) for your machine, use the "Open Location" or "Open URL" command to view the World-Wide Web home page at CERN (*http://info.cern.ch*), and navigate from there to the pages listing Web server software. These pages typically allow you to click on a hyperlink to download the server software and documentation in a single compressed archive file—Z format for Unix systems, SIT for Macintosh systems, and ZIP for Windows and Windows NT.

Next you use a system-specific utility to unpack the Web-server archive file. Follow the installation procedure described in the included doc files to set up a home page for your new Web server (a sample home page is usually included with the server software). Then go to another machine running a Web browser on your network and test the connectivity to your Web server. The logistics of these steps can vary wildly across system types: On a Unix workstation this test can be an all-day adventure, while on Windows NT and Macintosh machines it is literally only a few minutes' work. During the prototyping phase, you may opt to run the Web server software on your own workstation or personal computer for convenience while tweaking the various files, but eventually you'll want a dedicated machine for this purpose to maximize the server's availability and reliability.

In my own case, I had a networked machine already set up running Windows NT, Version 3.5, and Microsoft SQL Server, so I decided to run the Web server software on the same host. This has proved to be a fortunate decision: Windows NT 3.5 is an incredibly stable system, it includes an FTP server daemon (which is important when you want to maintain the Web server at a distance), and it runs ordinary Windows and DOS programs quite well. This means I could continue to use all my familiar editors and other tools. Although the machine is only midrange or less by today's standards (a 33-MHz 486 with 16MB RAM and an Adaptec SCSI adapter, 1GB hard disk, Hewlett-Packard DAT tape drive, and NEC double-speed CD-ROM drive), it has turned out to be more than adequate to run all three servers (SQL, FTP, and Web) simultaneously with good response times.

```
<HTML>
<HEAD>
<TITLE>CSMC Pediatrics Home Page</TITLE>
</HEAD>
<BODY>
<IMG SRC=pix/peds.gif><BR>
<HR>
<H2>Local Information Resources</H2>
<A HREF="refguide/refguide.htm">Physician's Referral Guide</A><BR>
<A HREF="guideln/guideln.htm">Clinical Guidelines and Pathways</A><BR>
<A HREF="pedsref/pedsref.htm">Pediatric Clinical Reference</A><BR>
<A HREF="neoref/neoref.htm">Neonatology Clinical Reference</A><BR>
<A HREF="phone/phone.htm">Pediatric Phone & Beeper Directory</A><BR>
<A HREF="resprog/res_peds.htm">Pediatric Residency Program</A><BR>
<A HREF="maps/maps.htm">Maps and Directions to CSMC</A><BR>
<HR>
<H2>Resources Elsewhere on the Internet</H2>
<A HREF="netdir.htm#pediatrics">Pediatric Resources</A><BR>
<A HREF="netdir.htm#genetics">Medical Genetics Resources</A><BR>
<A HREF="netdir.htm#medicine">General Medical Resources</A><BR>
<A HREF="netdir.htm#funstuff">Fun Stuff</A><BR>
<A HREF="netdir.htm#directories">Internet Directories</A><BR>
<HR>
<ADDRESS>
Created 12/27/94 / Last modified 1/27/95<BR>
Ahmanson Pediatric Center / Cedars-Sinai Medical Center / duncan@csmc.edu
</ADDRESS>
</BODY>
</HTML>
```

Figure 2: **The HTML code for the home page of my own Web server.**

For Web server software, I selected the program HTTPS, Version 0.96, developed by the European Microsoft Windows NT Academic Center (EMWAC). This organization, which has also developed WAIS and Gopher servers for Windows NT, is located at Edinburgh University and is sponsored by DataLink Computers, Digital Equipment Corp., Microsoft Corp., Research Machines, and Sequent. (HTTPS stands for *Hypertext Transport Protocol Server*; HTTP is the Internet protocol that Web servers and browsers use to communicate with each other.) You can download the EMWAC HTTPS program and its documentation at no charge from EMWAC's own Web server (*http://emwac.ed.ac.uk/html/internet_toolchest/top.html*) or by FTP; versions are available for the Intel 386 or higher, the DEC Alpha, and the MIPS CPUs.

If the TCP/IP protocol stack has already been configured on the Windows NT machine, EMWAC's HTTPS server could hardly be simpler to use. The downloaded archive file unpacks into the following individual files:

- HTTPS.EXE—the Web (HTTP protocol) server;
- HTTPS.CPL—the Control Panel applet for the server;
- HTTPS.HLP—the Control Panel applet's on-line -help file;
- HTTPS.DOC—the documentation for HTTPS as a Word for Windows file;
- HTTPS.PS—the documentation as a PostScript file;
- HTTPS.WRI—the documentation as a Windows Write file;
- EGSCRIPT.ZIP—sample CGI script programs (more about this in my next article);
- COPYRITE.TXT—the copyright statement for the software;
- READ.ME—miscellaneous release notes.

To install the software, you must first log in as administrator so you have access rights to all directories. Create a top-level directory (named something like C:\HTTP) that will serve as the home di-

Our Newest Servers Are Designed To Give

Solid Support. *As you'd expect from the world leader in networked servers, we've engineered our newest models to reliably serve in a NetWare environment.*

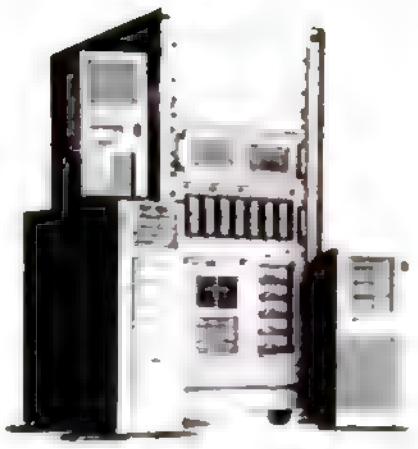
Early Warning System. *Compaq Insight Manager monitors hundreds of server components and warns you when problems are merely a possibility.*

Flexible Configuration. *SmartStart revolutionizes the setup process, automatically configuring and optimizing NetWare on your server.*

Fewer Aches And Pains. *Compaq servers are backed by our three-year on-site warranty* and free access to our 24-hour help line (with additional plans available).*

Moves Information Fast. *Compaq's TriFlex/PCI architecture builds upon the new PCI standard, for even higher performance.*

Prevents Unnecessary Strains. *Our Pre-Failure Warranty** replaces major parts at no cost — before they can interrupt a group's critical work.*



People are born with one. Businesses have to build them from scratch. To help you assemble the most reliable information backbone, Compaq announces a new generation of servers. They're all designed to faithfully serve the demands of workgroups and departments — from the expandable ProSignia line to the business-critical ProLiant family (with up to four Pentium processors). And they're all engineered to do what every

©1995 Compaq Computer Corporation. All rights reserved. Compaq registered U.S. Patent and Trademark Office. ProSignia and TriFlex are trademarks and ProLiant, SmartStart and Insight
Certain restrictions and exclusions apply. Monitors, battery packs and certain options are covered by a one-year warranty. For details, call the Compaq Customer Support Center at 1-800-345-1518.

YOUR COMPANY THE THING IT NEEDS MOST.

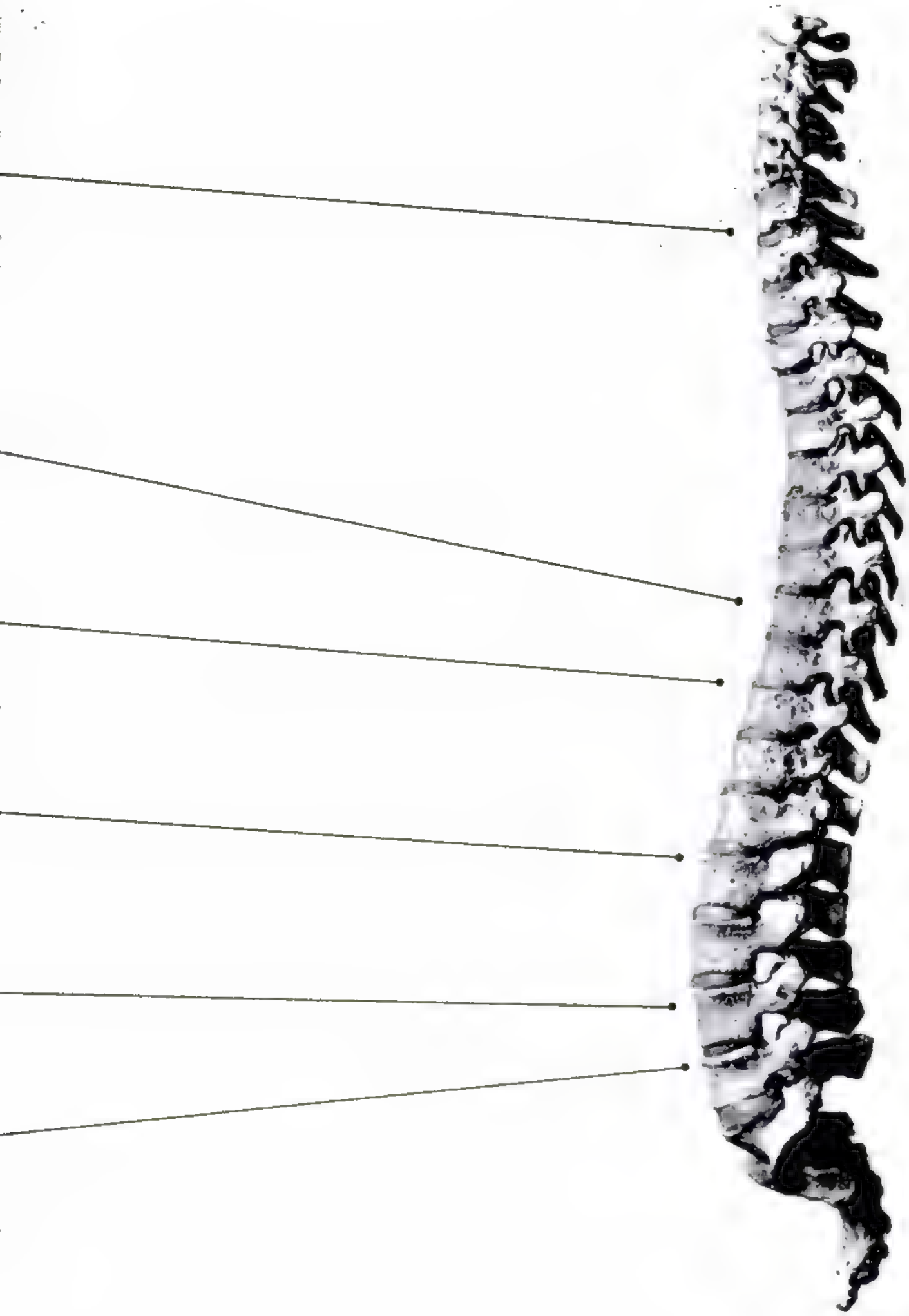


Fig. 1 Backbone

profitable business demands: keep running. Compaq's CD-based SmartStart ensures a smooth, integrated installation, and our Insight Manager constantly monitors for potential problems—which, if encountered, are covered by the Compaq Pre-Failure Warranty. For more information, call 1-800-853-9518 or visit our Web site at www.compaq.com. We can help you get the performance you need. As well as the support.

COMPAQ

anager are registered trademarks of Compaq Computer Corporation. NetWare is a registered trademark of Novell, Inc. Pentium is a registered trademark of Intel Corporation. *Limited warranty. *Applicable only to disk drives running under Compaq IDA, IDA-2 or SMART SCSI Array controllers and models with advanced ECC memory.

CIRCLE 308 ON READER SERVICE CARD

When It Comes To Mobile Computing, It's Your License To Speed.

It's AT&T's KeepInTouch™ card. The 14.4 Kbps data/fax modem that whisks you onto the cellular network with quicker connects and twice the throughput rates of MNP10, thanks to AT&T's unique Enhanced Throughput Cellular (ETC™). It even keeps up with changing technology - through a user upgradeable, flash memory that lets you download **Access the Globe.** software over the phone line to add new standards and features. Get the optional direct connect cable (as shown above) and you can link up with over 40 different cellular phones. So get your KeepInTouch Card(s) now. Call 800 554-4996, extension 202, for the name of the dealer nearest you. And remember to fasten your seatbelt. (By the way, if you need a speedy PCMCIA modem without needing cellular, just ask about our new KeepInTouch Express Card.)

CIRCLE 241 END USERS ON READER SERVICE CARD
CIRCLE 323 RESELLERS ON READER SERVICE CARD

AT&T

ETC

©1994 AT&T. KeepInTouch and ETC are trademarks of AT&T. All other products or services mentioned are trademarks, service marks, registered trademarks or registered service marks of their respective owners.

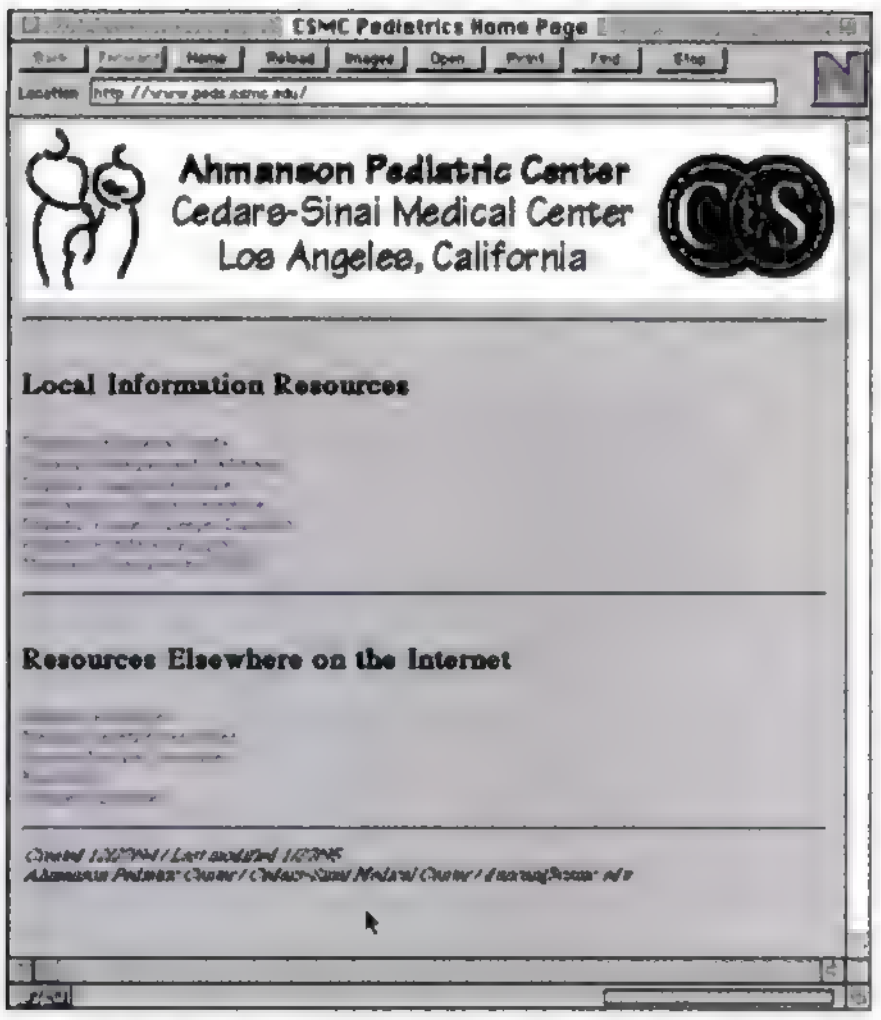


***Figure 3:* My Web server's home page appears this way in the Netscape browser.**

rectory for the documents published with your Web server. Move the Web server program HTTPS.EXE, the Control Panel applet HTTPS.CPL, and the help file HTTPS.HLP to their final locations (usually C:\WINNT\SYSTEM32). Open up a DOS command window and run the HTTPS.EXE file with the following -INSTALL command line parameter:

```
C>HTTPS -INSTALL <Enter>
```

This causes the Web server to register itself with the system's Service Manager and Event Logger. Next, select the Windows NT Program Manager, start up the Control Panel, and double-click on the HTTP Server icon.

You can then configure various aspects of the Web server such as the name and location of its home directory, the TCP/IP port that it will use for communications, and so on. In most instances, the default settings will be fine. Finally, return to the Control Panel, double-click on the Services icon, and configure the HTTP Server service to start up automatically when the system is booted. That's all there is to it — in less than 10 minutes, you are an electronic publisher on the World-Wide Web! But now comes the real work: adding content to your Web server! To build this content, you have to get your brain around a document-coding standard called HTML.

AN INTRODUCTION TO HTML

Hypertext Markup Language (HTML) is a scheme for representing the appearance and content of a document as a stream of plain ASCII text. The stream consists of reserved tokens, or commands, interspersed with the text that makes up the meat of the document. In this respect, HTML is conceptually similar to Rich Text Format (RTF), which I discussed in the March 14, 1995, column. But in practice, HTML is closer to to the industry's Standard Generalized Markup Language (SGML) than RTF. In fact, HTML can be thought of as a degenerative subset of SGML.

HTML, like SGML, is a *tag-based* language. The structural elements of a document and the text formats within the document are delineated by symmetric pairs of tags, which are simply ASCII sequences of characters with special delimiters. (There are a few exceptions to the pairing rule, although they may disappear in the future.) But while SGML is extremely general, extensible, and customizable, and thus almost infinitely flexible, HTML (in its present form anyway) is specific, narrowly scoped, and not extensible or customizable at all. But this means you can prepare HTML documents with even the simplest ASCII text editor, whereas SGML document preparation requires workstation-based tools with mind-boggling price tags.

The basic HTML commands you need to be familiar with to create your first Web *pages* fall into five categories (Figure 1):

- structural commands that identify a file as an HTML document and delineate the elements within the document;
- paragraph-formatting commands to delineate headings and force line breaks or paragraph breaks;
- character-formatting commands that apply various styles to a stream of text;
- list commands that format ordered (numbered) lists, unordered (bulleted) lists, and commented ("definition") lists; and
- anchor commands that encode a hyperlink from one document to another (or from one location in a document to another location in the same document) or encode the destination of such a hyperlink.

If one starts with the view-from-Earth-orbit of an HTML file, it consists of the balanced pair of structural tags <HTML> and </HTML>, with a bunch of stuff in between:

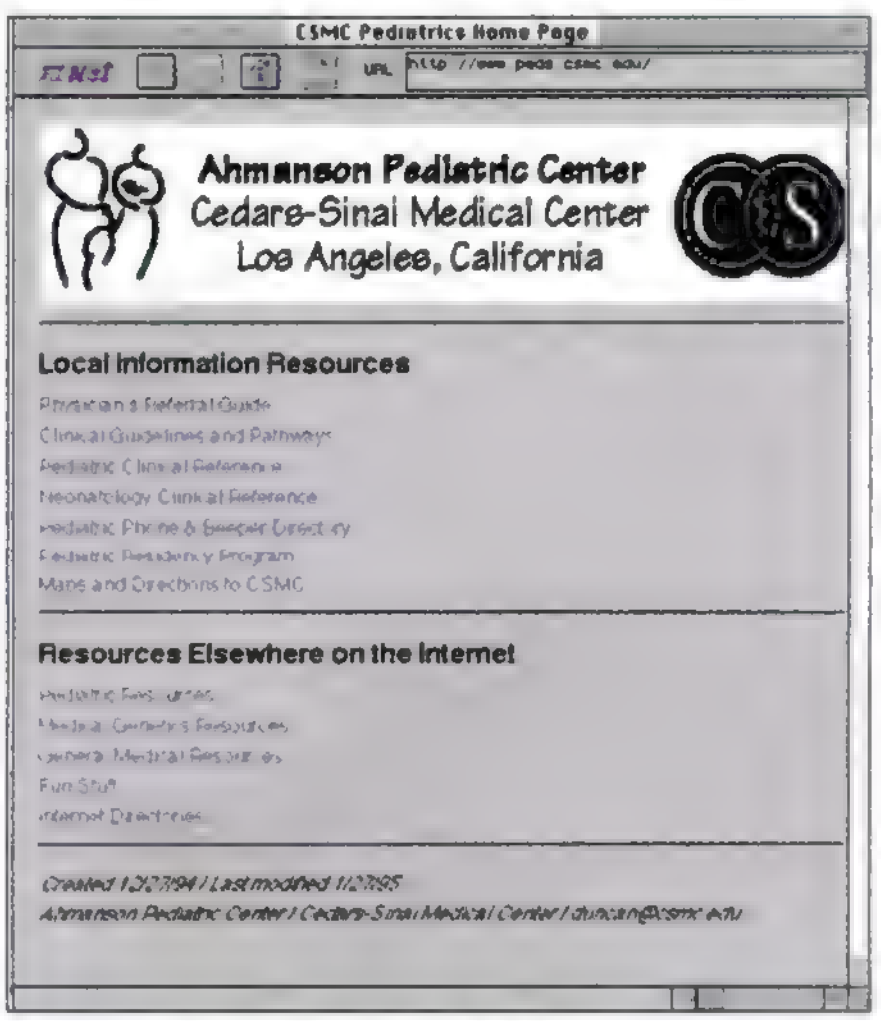


***Figure 4:* My Web server's home page looks like this when viewed in the MacWeb browser.**

```
<HTML>
.
.
.
</HTML>
```

The <HTML> tags tell a Web browser that it is dealing with an HTML text stream and not a binary resource of some kind or an alien document-encoding convention. At the next level of detail, the HTML document is divided into a *head* section and a *body* section:

```
<HTML>
<HEAD>
.
.
.
</HEAD>
```

```
<BODY>
.
.
.
</BODY>
</HTML>
```

Normally, not too much goes into the <HEAD> section of an HTML document, mainly just a particular chunk of text called the document title. This is marked by <TITLE> and </TITLE> tags and used by Web browsers to update their title bars and hotlists. For example:

```
<HTML>
<HEAD>
<TITLE>My Document Title</TITLE>
</HEAD>
<BODY>
.
.
.
</BODY>
</HTML>
```

The "title" is not, in spite of its name, the text that is perceived by the user of the Web browser as the document's main title or heading, because it does not appear within the client area of the browser window. This point often confuses newcomers to HTML coding since it is not explained clearly in most HTML tutorials.

Within the <BODY> section of an HTML document, we find the actual content that is presented to the user by the Web browser. The <BODY> section consists of a flexible mixture of headings, paragraphs of text separated by white space, and lists. Six levels of headings are supported, as well as the several types of lists already mentioned. Some rudimentary control of text flow at the sub-paragraph level is provided by commands that force line breaks or put the text into a nonproportional font and disable automatic line wrapping. Within the substance of paragraphs or list items, streams of text can be emphasized in various ways (boldface, italic, underline, or nonproportional font) or designated as *anchors*.

For example, the following HTML document

```
<HTML>
<HEAD>
<TITLE>My Document Title</TITLE>
</HEAD>
<BODY>
<H1>My First Heading</H1>
This is the <B>first</B>
paragraph.<P>
This is the <I>second</I>
paragraph.<P>
</BODY>
</HTML>
```

would look like this in a Web browser:

My First Heading

This is the **first** paragraph.

This is the *second* paragraph.

The text of the headings and paragraphs, and the spaces between them, are automatically wrapped and reflowed according to the resolution of the screen and the size of the Web browser's window, which brings up some interesting points. HTML encodes the structure and style of a document, but the actual appearance of the document in terms of typefaces, character sizes, spacing between paragraphs, and so on is the province of the Web browser. The browser is allowed a certain amount of poetic license while trying to make the best of the resources and capabilities of the machine on which it is running (Figures 2, 3, 4, and 5). Additionally, some browsers are smarter or more forgiving than others, so if you make an error in your HTML coding or nest several different styles inside each other, the results you get may be quite different from one browser to another.

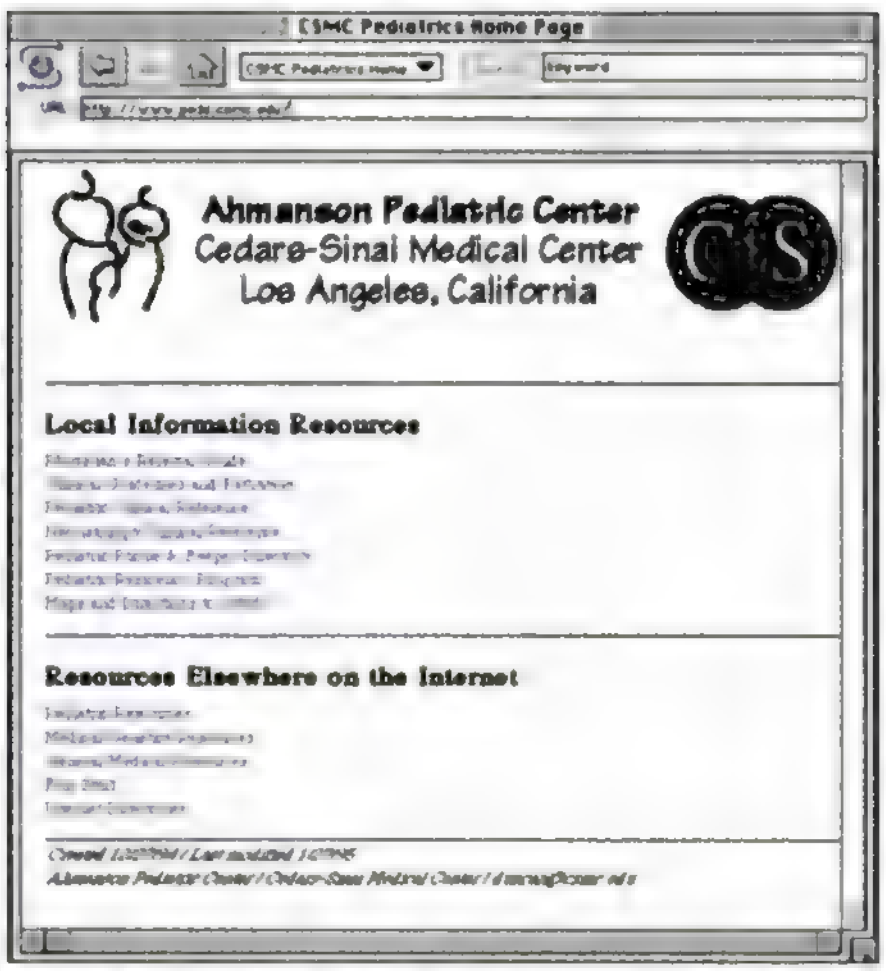


***Figure 5:* Here's how my Web server's home page looks in the Mosaic browser.**

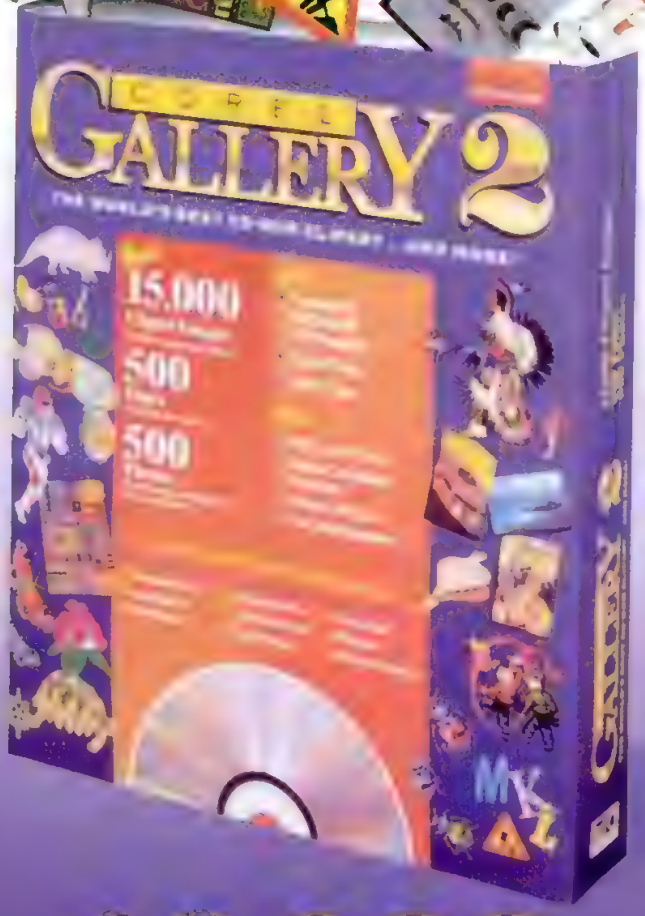
Web servers, in contrast, are intentionally rather stupid beasts. A Web server just listens on a particular TCP/IP port for requests arriving via the HTTP and delivers up files in response to those requests; it doesn't much care whether the contents of those files are HTML, Sanskrit, or Klingon. The Web browser program has the problem of figuring out whether it can actually render the file on the screen and, if not, looking around in the user's system and finding some other helper program to do the work on its behalf (video and audio clips are typically handled in this manner). From this you might guess that a Web server could be implemented in just about any reasonably powerful language, including interpreted scripting languages such as PERL, which has actually been done.

In my next Power Programming column, I'll go into more detail about document preparation, interactive forms, and the use of scripts and queries to build Web materials on the fly. In the meantime, you'll soon discover that manual editing of HTML documents to insert the necessary tags is tiring and prone to error. Go on-line to the Inter@ctive Week (IAWEEK) Forum on ZiffNet or the World-Wide Web home page at CERN and download one of the many specialized editors that automate HTML tag insertion and syntax checking. When I checked the IAWEEK Forum at the time of this writing, the Forum's libraries contained no less than three different HTML editors for Windows—HotMetal, HTML Assistant, and HTML HyperEdit—as well as some WinWord 2.0 and WinWord 6.0 document templates for HTML generation.

THE IN-BOX Please send your comments and suggestions to me at any of the following e-mail addresses: PC MagNet: 72241,52; MCI Mail: RDUNCAN; Internet: *DUNCAN@CERF.NET* □

New!

- 15,000 Clipart images
- 500 Fonts
- 500 Photos
- A powerful multimedia file manager
- 75 Sound clips
- 10 Video clips



WORKS WITH ALL WINDOWS APPLICATIONS

WORD PROCESSING
- Microsoft Word
- Lotus AmiPro
- WordPerfect

OFFICE PRODUCTS
- Microsoft Office
- Lotus SmartSuite
- Perfect Office

PRESENTATIONS
- PowerPoint
- Freelance
- Harvard Graphics

500 Photos

15,000 Clipart Images

(5,000 new images plus 10,000 images from GALLERY 1)

500 Fonts

CDW COMPUTER DISCOUNT WAREHOUSE

$34.50*

800-279-4CDW

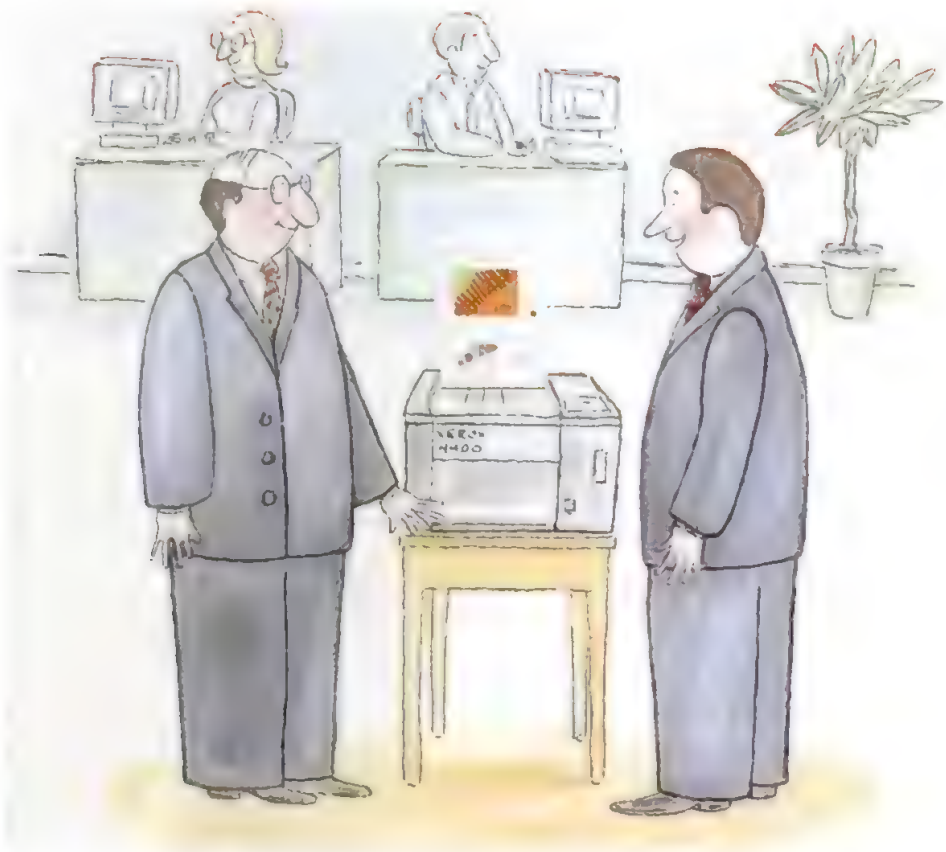
*US$ plus applicable taxes

COREL

Call now for faxed literature!
1-613-728-0826 ext. 3080
Document #1055

CIRCLE 011 ON READER SERVICE CARD.

When winning business means big bucks, count on the Xerox 4900 Color Laser Printer.



"It's helped us land so much new business, we're thinking of paying it a commission."

Sure, other printers can give you color. But do they give you a competitive advantage? The unmatched image quality of the Xerox 4900 Color Laser Printer will startle your prospects, pull in new business, and make your ideas memorable. Quad-dot technology brings your documents to life; high speeds for both color and B&W printing quickly get your proposals off the network, out of the printer, and into your clients' hands. An affordable printer that keeps you a step ahead, a cut above your competition ... and backed by our three-year Total Satisfaction Guarantee, to boot. So call us today at 1-800-34-XEROX, Ext. 101. Put more power in your sale.

Mac/PC Ready

12/3 ppm

1200 x 300 dpi

Adobe PostScript Level 2

THE DOCUMENT COMPANY

XEROX

Adobe PostScript

Xerox®, The Document Company®, and 4900 are trademarks of XEROX CORPORATION.
Adobe® and PostScript® are trademarks of Adobe Systems, Inc.

CIRCLE 916 ON READER SERVICE CARD

Utilities

BY NEIL J. RUBENKING AND CARL RANKLIN

GUIToons Livens Up Your Screen

In the olden days, screen savers did what their name suggests: protected monochrome monitors from screen burn-in. These days, the main goal of a Windows screen saver is to provide a pleasant way to personalize your computer or to password-protect your machine while you're away from your desk. This issue's free utility, GUIToons, is a special sort of screen saver because it lets you create an animation by supplying your own bitmaps. Otherwise, GUIToons works like any other screen saver. When a specified period of time elapses without any keyboard or mouse activity, Windows loads GUIToons and begins animating. When someone presses a key or moves the mouse, GUIToons restores the PC to its prior state.

GUIToons was written in Microsoft Visual Basic 3.0 (VB3). You can obtain GUIToons and its source code at no charge by downloading the files from *PC Magazine*'s ZiffNet or by mail. Refer to the sidebar "Guide to Our Utilities & How To Get Them" for the details.

USING GUITOONS GUIToons is a standard Windows screen saver. You configure and test GUIToons using the Desktop applet in the Windows Control Panel. To install GUIToons on your system, copy the program file GUITOONS.SCR to your Windows directory (usually C:\WINDOWS). If you do not have VB3 on your system, you will also need to copy VBRUN300.DLL and CMDIALOG.VBX to your Windows System directory (usually C:\WINDOWS\SYSTEM).

When the GUIToons screen saver is activated, bitmaps you selected during configuration are displayed in a series and moved around on the screen, giving the appearance of animation. The screen can be cleared to black before the animation begins, or you can leave it as it is. If the screen is not cleared, the animation will be superimposed over the current background.

To bring up GUIToons' Setup window, follow these steps. Launch the Desktop applet in the Control Panel window, select GUIToons from the list of screen savers, and then click the Setup button. GUIToons' Setup window is shown in Figure 1.

You select the bitmap files for the animation in the Setup window. The bitmaps must be in the Windows bitmap (.BMP) format. GUIToons creates the animation by displaying the bitmaps sequentially. The bitmaps are displayed first in forward order, then backward order, and then forward again in a continuing pattern. For example, if you had three bitmaps, they would be displayed like this:

```
1, 2, 3, 2, 1, 2, 3, 2...
```

Top 10 Utilities

Rank	Utility
1	**FDDLLS** - *Finds dead DLLs*
2	**FINDIRQ** - *IRQ line analysis*
3	**WTIME** - *Keeps PC clock accurate*
4	**INCTRL** - *Controls Windows installation*
5	**MYGRPS** - *Customizes group icons*
6	**WINCMD** - *Command file interpreter*
7	**BUGS** - *Windows 3.1 screen saver*
8	**PLICON** - *Places program icons*
9	**SCHEDULER** - *Runs programs automatically*
10	**PASTE** - *Enhanced Windows clipboard*

This list is based on the total number of downloads each utility has had on PC MagNet over the past month. To download these files, type GO ZNT:TIPS. For more information, see the sidebar "Guide to Our Utilities & How to Get Them."

The best types of bitmaps are those that comprise half of a complete movement. For example, you could have the face of a man opening his mouth in three bitmaps: closed, half-open, and open. When the sequence is animated the mouth will appear to open and close over and over again.

Select the bitmaps you want by clicking the Add button. A Windows common dialog box will appear in which you can select the .BMP files you wish to use in your animation. If you select just one file, GUIToons will simply move the picture around on the screen with no animation. This can create an interesting effect with certain bitmaps. For example, you might want to try it with the Windows logo file, WINLOGO.BMP, stored in the Windows Directory.

To select more than one bitmap file at a time, drag the left mouse button, or hold down the Ctrl key and click on more than one file. The Setup screen also contains buttons to clear the list of files and delete the highlighted file from the list. If the Insert check box is checked, bitmaps you add will be inserted before the highlighted item in the list.

GUIToons also gives you control over other aspects of the animation. The Animation Speed slider lets you control the time interval between animation frames. Positioning the slider all the way to the left (slow) results in the longest interval between frames; positioning the slider all the way to the right (fast) results in the minimum interval between frames. Positioning the slider between these two extremes lets you fine-tune animation speed. If the animation appears choppy, try increasing the animation speed.

The Screen Movement slider controls how much the position of each frame differs from that of the previous frame. Moving the slider to the left decreases the movement; moving it to the right increases the movement. The maximum movement is 50 pixels; the minimum movement is 1 pixel.

The Background options determine what happens to the underlying screen when the screen saver kicks in. If you would like to clear the underlying screen, select Clear. If you want the screen to remain as it is, select Leave Alone. If the screen is not cleared, the animation will

Figure 1: **GUIToons' setup screen lets you select which bitmaps to use, and set animation speed, screen movement speed, and other options.**

be superimposed over the background.

GUIToons includes optional password protection. When you supply a password (see Figure 2), it is encrypted and saved to disk. To change the password, you must know the existing password.

When the screen saver animation is terminated with a mouse movement or a key press, a dialog box pops up and asks for the password (see Figure 3). Without the correct password, the screen saver will not end, and the user is locked out of the computer.

If you forget your password, edit the CONTROL.INI file and find the [ScreenSaver] section. Delete the line that begins

Figure 2: **GUIToons includes optional password protection. To change the password, you must know the existing password.**

"Password=". Now you can respond to the dialog box requesting the password by simply pressing Enter, and you can set the password to whatever you want by leaving the Old Password line blank. Note that anyone can bypass GUIToons's password protection by doing this, so don't count on your screen saver to provide infallible security.

When you click on the Test button, you will see the result of the settings you have chosen. You may notice a delay after clicking Test before the screen saver kicks in. GUIToons is slow to load because it was written in Visual Basic. Visual Basic speeds development time for programmers, but the programs themselves execute more slowly than programs written in true compiled programming languages.

MAKING SCREEN SAVERS WITH VB Only two steps are needed to make a VB screen saver program accessible from the Windows Control Panel. First, you must save the executable file with an .SCR extension instead of the default .EXE extension. Second, you must give the application description a prefix of "SCRNSAVE:". In this case, the application title is "SCRNSAVE:GUIToons". You take care of both tasks in the dialog box that appears when you select Make EXE File... from VB's file menu.

The Desktop applet in the Windows Control Panel contains a section for screen savers which includes a Setup button and a Test button. When a user clicks the Setup button, the Control Panel runs the screen saver with the /c command line switch. As shown below, GUIToons looks at the command line argument in the Form_Load procedure, and displays the Setup form if /c is specified:

```
If InStr(Command$, "/c") Then
  frmSetup.Show 1
  Me.Visible = False
  Exit Sub
End If
```

If you are running GUIToons from within VB and wish to access the Setup screen, set the "Command Line Argument" project option to "/c" (without the quotes).

When the user clicks the Test button, the screen saver is run with the command line argument /s. This switch is also used when Windows loads GUIToons as a result of keyboard and mouse inactivity.

INSIDE GUITOONS To produce animation, GUIToons quickly displays the bitmaps one after another to give the illusion of movement. This is similar to old-fashioned flip books, where each page is a still image and flipping the pages quickly makes the image appear to move.

You might think this could be implemented by moving picture controls around on the screen. That would work, but only against a solid-color background. For example, you could take a bitmap of a red circle on a black background and move it around on a black screen without much trouble. But what if the screen has a picture on it? The picture control will show a solid rectangle around the image, which is unacceptable. If you want to animate a bitmap on a background with an image, you cannot rely solely on picture controls.

The key to displaying a bitmap image on a nonsolid background is a technique called *masking*. Simply put, a mask is a silhouette of the image where the image it-

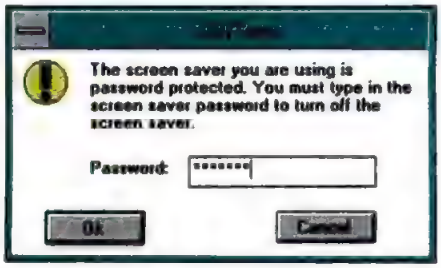


Figure 3: **When using GUIToons with password protection, you must enter the correct password to terminate the screen saver.**

self is black, and the background (which we want to make transparent) is white. The top three images in Figure 4 show a foreground bitmap, the corresponding mask, and an example background. The bottom row shows three stages in the masking process that superimposes the image onto the background.

The secret to transparent background animation is in the way the mask is combined with the picture and the background. We use a memory device context (DC) for a workspace, and start by copying the background to the workspace. Figure 4c represents this step.

The next step is to combine the foreground image with the workspace, which

IF YOU THINK REMOTE COMPUTING IS A HASSLE, YOU'RE PROBABLY NOT ONE OF THE MILLIONS OF PEOPLE USING pcANYWHERE.

What good is working away from the office if you can't access your PC? Unfortunately, most remote computing software has become so complex, you may waste more time setting up your call than getting work done. Luckily, now there's Norton pcANYWHERE™ 2.0 for Windows.

NEW VERSION 2.0

THE BEST GETS BETTER.

Norton pcANYWHERE is the most advanced implementation of remote computing technology available, made easy. But don't take our word for it. Millions of people have already expanded their growing work environment with Norton pcANYWHERE.

PC MAGAZINE EDITORS' CHOICE August 1994 pcANYWHERE 1.0

And why wouldn't they? Norton pcANYWHERE doesn't require TSRs, freeing up memory for other applications you may need. Moreover, pcANYWHERE doesn't replace any system .INI drivers, so you don't have to change your Windows environment to use it. pcANYWHERE is actually the only remote access software available today that offers this unique feature set combination.

Of course, to make sure you're always working with the most recent version of your file, our new file manager saves you time by allowing you to synchronize your files and directories on remote and office PCs.

LEAVE YOUR HASSLES AT THE OFFICE.

But the real beauty of Norton pcANYWHERE is it's easy to use. And to make it even easier, we've included Smart Set-Up™ and Norton Assistant to help you get up and running right out of the box. And a graphical user interface with long file name support already built in to help you in the transition to Windows 95. So stop by your local software store today. After all, millions of people can't be wrong.

The Peter Norton Group has made remote computing easier for everyone with Norton pcANYWHERE.

GET A $30 REBATE

For a limited time get a special $30 rebate when you purchase Norton pcANYWHERE for Windows or DOS. That's almost 30% off the estimated street price.

SYMANTEC.®

Symantec is a registered trademark and Norton pcANYWHERE and Smart Set-Up are trademarks of Symantec Corporation. All other trademarks or registered trademarks are the property of their respective holders. Not valid where prohibited by law. Offer good for end-user purchases of Norton pcANYWHERE for Windows between 2/20/95 and 5/31/95 with redemption through July 31st. All rebates must be accompanied by proof of purchase and coupons must be postmarked on or before 7/31/95. Not applicable to upgrade, and other specially priced products. Not valid with any other promotion. Offer includes 60-day money-back guarantee. Offer not available to resellers. Offer valid in U.S.A. only. Prices listed in U.S. dollars. Limit one rebate per customer. Allow 4-6 weeks for delivery. For more information in Canada, call 1-800-667-8661, ext. 5513. In Australia, call 2-879-6577. ©1995 Symantec Corp. All rights reserved.

CIRCLE 906 ON READER SERVICE CARD

currently contains the background image, using the SRCINVERT operation. The SRCINVERT operation combines images pixel by pixel using the XOR operator, so that corresponding bits in a pixel's color become a 1 if there is a 1-bit in *either* of the images, but *not both*. As you can see in Figure 4d, the resulting image is different from either the foreground or the background, but contains elements of both.

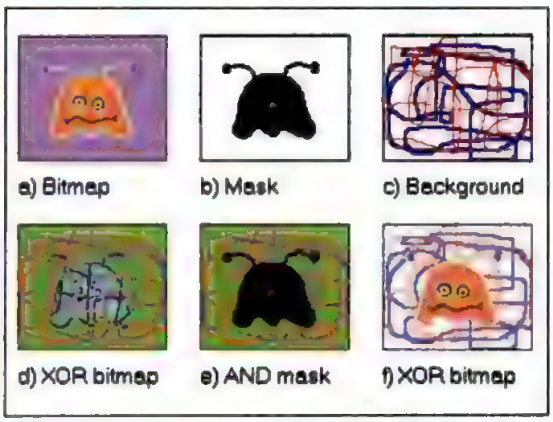


Figure 4: **The pictures in the top row show the foreground image, the image mask, and a background image. Those in the bottom row show the image XORed with the background, the mask ANDed with the background, and the image XORed with the background again.**

Then the mask is copied to the workspace using the SRCAND operation. With SRCAND, the pixel colors from the two images are combined using the AND operator. The corresponding bits from the two pixels must both be 1 for the resulting pixel to contain a 1-bit in that location. The results, as shown in Figure 4e, are predictable because of the way the mask is constructed: The black silhouette of the image is all 0-bits and the white background is all 1-bits. The background image will stay exactly the same—bits that are on will stay on, and bits that are off will stay off. The bits in the foreground image, on the other hand, will all be turned off. The result will be a black silhouette of the image superimposed on the background image.

The last step is to combine the foreground image with the workspace image using SRCINVERT again. It seems like magic, but as Figure 4f shows, this results in the foreground image being drawn in the area where it was previously silhouetted. This happens because of two properties of the XOR operator. If you XOR value B with value A and then XOR value B again with the result, you get back value A. This explains why the background outside the mask silhouette is unchanged; it was XORed twice with the same portion of the foreground image. If you XOR any value with 0 (black), the result is the original value, unchanged. The foreground of the image is XORed with the black silhouette, so it comes through unchanged.

GUITOONS uses the VB picture control to create memory DCs (device contexts) by setting the AutoRedraw property to True and the Visible property to False. The Windows API function BitBlt (pronounced "bit-blit" and standing for *bit block transfer*) is used to combine the images and create each frame of the animation (see Figure 5). BitBlt's first argument is the handle of the target device context. The next two arguments are the x and y positions where the image will be drawn. The fourth and fifth arguments represent the size of the image—its width and height. The sixth, seventh, and eighth arguments are the source DC, and the *x* and *y* offset from which to copy.

The last argument in BitBlt is a constant, defined by the Windows API, that says how to copy the bitmap. The constant SRCCOPY tells BitBlt to copy the source to the destination without modification of any kind. The constant NOTSRCCOPY tells BitBlt to copy the source to the destination but invert the bits. The constant SRCINVERT is used to XOR bitmaps; SRCAND is used to AND bitmaps. Other binary operators are available as well, but these are the ones used by GUITOONS.

This complicated masking process can be simplified when GUITOONS has been told to clear the screen. As Figure 5 shows, if the variable ClearScreen is True, only three BitBlt operations are needed. The first copies the mask to the workspace using NOTSRCCOPY, which results in a mask with the image in white and the background in black. The second ANDs the image with this mask, yielding the foreground image with a black background. The third BitBlt, used whether or not the screen was cleared, copies the workspace to the display.

WHEN GUITOONS KICKS IN All of GUITOONS's setup code is contained in the Form_Load event procedure. This code loads the bitmap files, initializes key vari-

```
'-- Draw the next Frame at the next x and y coordinates

If ClearScreen% Then

   '-- Copy the mask to the workspace, exchanging white and black
  Success = BitBlt(WorkDC, 0, 0, bWidth, bHeight, DC(Frame).IntMaskDC, 0, 0, NOTSRCCOPY)

   ' Copy the bitmap to the workspace with AND
  Success = BitBlt(WorkDC, 0, 0, bWidth, bHeight, DC(Frame).IntPicDC, 0, 0, SRCAND)

Else

   '-- Copy the target area from picScreenCap to picWorkspace
  Success = BitBlt(WorkDC, 0, 0, bWidth, bHeight, ScreenCapDC, X, Y, SRCCOPY)

   '-- Copy the bitmap from picPicture to picWorkSpace with XOR
  Success = BitBlt(WorkDC, 0, 0, bWidth, bHeight, DC(Frame).IntPicDC, 0, 0, SRCINVERT)

   '-- Copy the mask from the Mask DC to picWorkSpace with AND
  Success = BitBlt(WorkDC, 0, 0, bWidth, bHeight, DC(Frame).IntMaskDC, 0, 0, SRCAND)

   '-- Copy the bitmap again to picWorkSpace with XOR
  Success = BitBlt(WorkDC, 0, 0, bWidth, bHeight, DC(Frame).IntPicDC, 0, 0, SRCINVERT)

End If
  '-- Copy the entire frame from picWorkspace to the Display (main form).
Success = BitBlt(DisplayDC, X, Y, bWidth, bHeight, WorkDC, 0, 0, SRCCOPY)
```

Figure 5: **The code shown here uses the masking technique to combine the images and create the superimposed foreground image.**

{ *your computer.* } { *your computer with Paradise.* }

average. plain. basic.

Ordinary might be fine for some people, but not for others. Some people want bluer waters, warmer sands and cooler breezes – something more *exotic*. And there's a word for people like this:

Paradise.

Paradise introduces Bali, Bahamas and Barbados, our new "island" line of graphics accelerator cards. Naturally, these new boards deliver brilliant colors and let you blaze through Windows and games. What's more, Oasis utility software gives you picture-in-picture capabilities and lets you change resolutions and refresh rates on the fly. And, with trouble-free setup, compatibility and ease of use, you can relax and enjoy the islands.

To further enhance your peace of mind in *Paradise*, all our island products are covered by a *five*-year warranty. And with new full-motion video products on the horizon, *Paradise* is looking more enticing all the time.

So if you're looking for something better, come to *Paradise*. And to get here, call Insight at 1-800-398-0373.

Western Digital Corporation ®

FREE T-SHIRT! See store for details.

Insight

1-800-398-0373

BALI 32
32-bit DRAM acceleration
1280 x 1024 resolution
16.8 million colors
PCI and VL Bus

BAHAMAS 64
64-bit DRAM acceleration
1600 x 1200 resolution
16.8 million colors
PCI and VL Bus

BARBADOS 64
64-bit VRAM acceleration
*1600 x 1200 resolution
16.8 million colors
PCI Bus

PARADISE.

Where everything is better.

© 1995 Western Digital Corporation. Paradise is a registered trademark of Western Digital.

CIRCLE 167 ON READER SERVICE CARD

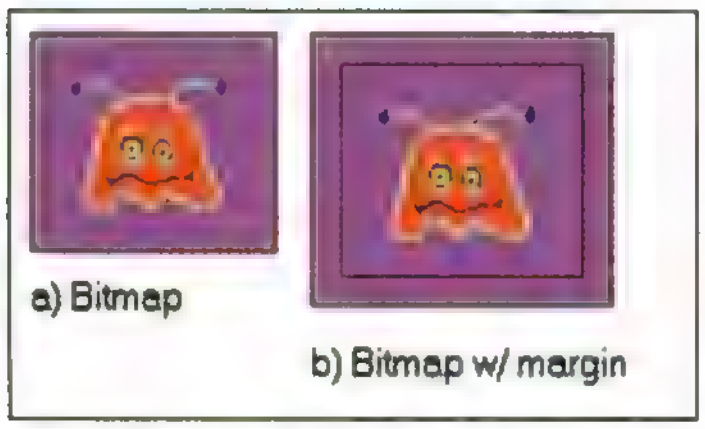


Figure 6: **The extra margin around the image represents the maximum screen movement, which is set in the setup window.**

ables, creates the masks, and gets everything ready to be animated.

First, GUIToons' user settings are read from the CONTROL.INI file. This includes the number of bitmaps, the bitmap file names, and whether the screen should be cleared or left alone. The password is saved to CONTROL.INI under the heading [ScreenSaver]; the settings specific to GUIToons are saved in CONTROL.INI under the heading [Screen Saver.GUIToons]. For the options selected in Figure 1, the WIN.INI section looks like this:

```
[ScreenSaver]
Password=hUzn^.

[Screen Saver.GUIToons]
Bitmap1=E:\UTIL\WIP\GUITOONS\BUG1.BMP
Bitmap2=E:\UTIL\WIP\GUITOONS\BUG2.BMP
Bitmap3=E:\UTIL\WIP\GUITOONS\BUG3.BMP
Interval=1
MoveSpeed=5
NumBitmaps=3
PWProtected=1
ClearScreen=0
```

Next, the bitmaps are loaded into the picLoader picture control and copied into the picPicture() control array. The background color of each picPicture box is set to the same color as the picture's background, which is sampled by checking the color of the top-left pixel. This ensures that the background will be white in the monochrome-mask bitmap. Note that if the pixel in the top-left corner is not the background color you want, you'll have to load the bitmap into PaintBrush and change the color of that pixel.

When the bitmap is copied from picLoader into picPicture, an extra margin is left around it (see Figure 6). The size of this margin depends on the amount of movement between frames, defined in terms of pixels, which is set in the setup window.

Say, for example, the user has set the Screen Movement slider so that the maximum number of pixels to move is 10. In this case, picPicture is created 20 pixels wider and 20 pixels higher than the original bitmap, which is then copied to pixel location (10, 10), leaving a 10-pixel margin on every side.

When a new frame is displayed on the screen, it covers up the frame that was there before. (Each frame is a square containing the picture against the background.) By defining a margin equal to the number of pixels that the animation can move between frames, we ensure that each frame will cover all traces of the previous frame.

Once all of the .BMP files are loaded, the masks are created. Next GUIToons checks if you want the background screen left alone. If so, the entire screen is captured and copied to the DC of the main form, called the DisplayDC, so it can be used as the background for the animation. Then when GUIToons is activated, the main form—a screenshot of your display—fills the screen.

ANIMATING THE BITMAPS A VB Timer control is used to trigger the animation. The Timer control fires an event at the interval determined by the Animation Speed setting in the Setup screen. If Animation Speed is set to 50 (the fastest), the timer interval is set to 1 timer tick (about 55 milliseconds); if it's set to 1 (the slowest), the timer interval is 50 timer ticks. It is in the Timer-event procedure that each frame is constructed and displayed.

The setup code in the Timer1_Timer event procedure (see Figure 7) keeps track of the direction in which the bitmaps are cycling and picks the next bitmap number to be displayed. Once the bitmap has been determined, GUIToons calculates new coordinates by adding the variables Movex and Movey

```
Static Frame, Direction, X, Y, BeenHere

If BeenHere = False Then
      '-- Initialize (first time only)
  Frame = 0         '-- Frame is the Frame number
  X = -MoveSpeed    '-- Remember MoveSpeed = Margin
  Y = -MoveSpeed
  Direction = True '-- True = Foreward, False = Backwards
  BeenHere = True
End If

  '-- Pick the next bitmap. The bitmaps are
  '   circulated (0,1,2,3,4,3,2,1,REPEAT)

If Direction Then    '-- Foreward
  If Frame < NumBitmaps - 1 Then
    Frame = Frame + 1
    If Frame > NumBitmaps - 1 Then Frame = 0
  Else
    Direction = False
    Frame = Frame - 1
    If Frame = -1 Then Frame = 0
  End If
Else                 '-- Backwards
  If Frame > 0 Then
    Frame = Frame - 1
    If Frame = -1 Then Frame = 0
  Else
    Direction = True
    Frame = Frame + 1
    If Frame > NumBitmaps - 1 Then Frame = 0
  End If
End If

  '-- Pick an X coordinate for the bitmap
X = X + MoveX
Do
  If X >= pixWidth - bWidth + MoveSpeed Then
    ResetMoveX -1
    X = X + MoveX
  ElseIf X <= -MoveSpeed Then
    ResetMoveX 1
    X = X + MoveX
  Else
    Exit Do
  End If
  DoEvents
Loop

  '-- Pick a Y coordinate for the bitmap
Y = Y + MoveY

  If Y >= pixHeight - bHeight + MoveSpeed Then
    ResetMoveY -1
    Y = Y + MoveY
  ElseIf Y <= -MoveSpeed Then
    ResetMoveY 1
    Y = Y + MoveY
  Else
    Exit Do
  End If
  DoEvents
Loop
```

Figure 7: **This code keeps track of the direction in which the bitmaps are cycling and picks the next bitmap number to be displayed.**

OUR COLOR

But the features that come with it will.
Now QMS can add color and life to your documents for just $4,999.

LASER PRICE

The QMS *magicolor*® LX Laser Printer—high resolution text output and automatic color optimization that make your documents as professional as you are.

WON'T BLOW

Plus, CrownNet™ multiplatform connectivity and Crown® multitasking technology increase your productivity without sacrificing quality.

YOU AWAY.

For a difference you can see, at a price you can afford,
call ***800 841-0754*** Dept. ***5041*** today.

QMS

Outperform The Very Best.

For service on QMS or other products, call 800 762-8894 (U.S.) • Q-Fax 800 633-7213 • Canada 800 263-5508

QMS, the QMS logo, *magicolor*, CrownNet and Crown are trademarks or registered trademarks of QMS, Inc. One Magnum Pass, Mobile, AL 36618, 334 633-4300

```
Sub EncryptString (Source$)
    ' Encrypt a string the same way the standard screen saver
    ' library does it. The result is based on the XOR operation,
    ' but it's guaranteed to produce a string containing
    ' valid characters (no control characters, no nonprintable
    ' characters, and so on)
  Dim Strg$, StrgLg%, StrgPt%, TheByte%

  StrgLg = Len(Source$)
  If StrgLg = 0 Then Exit Sub
    ' Convert string to uppercase
  Strg = UCase$(Source$)

    ' Process characters from first to last
  For StrgPt = 0 To StrgLg - 1
    TheByte = Asc(Mid$(Strg, StrgPt + 1, 1))
    EXor StrgLg, TheByte      'Xor byte with password length
    If StrgPt = 0 Then
      EXor &H2A, TheByte      'Xor first byte with constant
    Else
      EXor StrgPt, TheByte    'Xor with position
      EXor Asc(Mid$(Strg, StrgPt, 1)), TheByte  'Xor with prev char
    End If
    Mid$(Strg, StrgPt + 1, 1) = Chr$(TheByte)
  Next
  If StrgLg = 1 Then Exit Sub

    ' Process characters from last to first
  For StrgPt = StrgLg - 1 To 0 Step -1
    TheByte = Asc(Mid$(Strg, StrgPt + 1, 1))
    EXor StrgLg, TheByte      ' Xor byte with password length
    If StrgPt = StrgLg - 1 Then
      EXor &H2A, TheByte      'Xor first byte with constant
    Else
      EXor StrgPt, TheByte    'Xor with position
      EXor Asc(Mid$(Strg, StrgPt + 2, 1)), TheByte 'Xor with next char
    End If
    Mid$(Strg, StrgPt + 1, 1) = Chr$(TheByte)
  Next
  Source$ = Strg
End Sub

Sub EXor (X1, X2)
  Select Case X2 Xor X1
    Case &H0 To &H20, &H7F To &H99, &H93 To &H9F, &H3D, &H5B, &H5D
    Case Else
      X2 = X2 Xor X1
  End Select
End Sub
```

Figure 5: **GUIToons has to encrypt password strings without help from the Windows screen-saver object library; this code does the job.**

to the *x* and *y* coordinates.

Every time the animation hits an edge of the screen, a new Move value is calculated for the direction in which it was moving when it hit the boundary. The ResetMovex and ResetMovey routines set Movex and Movey to this random number. The effect is that the animation appears to bounce off the sides of the screen and pick a new direction when the edge is encountered.

Once the frame and direction are selected, the five BitBlt steps shown in Figure 5 (three steps if the screen was cleared) are executed. This occurs once on every timer event until a key is pressed or the mouse is moved or clicked.

MOUSE AND KEYBOARD HANDLING When the mouse is moved over the main form, the Form_MouseMove event is fired. The MouseMove event is fired once when the form is first displayed, and again every time the mouse is moved. Therefore, as shown below, GUIToons waits until the second mouse movement before it exits:

```
Sub Form_MouseMove (...)
  If JustAMoment Then Exit Sub
  Static Once
  If Once Then
    Unload Me
    Once = False
  Else
    Once = True
  End If
End Sub
```

When a key is pressed, the Form_KeyPress event is fired. Unlike MouseMove, this event does not occur when the program loads, so the screen saver exits when the first keypress is detected. Here is the code to respond to a keypress event; mouse clicks are handled in exactly the same way.

```
Sub Form_KeyPress (KeyAscii%)
  If Not JustAMoment Then Unload Me
End Sub
```

The variable JustAMoment serves to "debounce" the screen saver. If you cancel the password-entry form by pressing Esc or clicking the Cancel button, the form will reappear immediately without JustAMoment. GUIToons sets JustAMoment to True when the password-entry form closes, and False when the timer ticks next.

Some clean-up code is also needed in the main form's Form_Unload event procedure. The mask bitmaps and DCs must be destroyed, and the Screen DC must also be destroyed. All of a Windows program's resources must be freed before it ends, otherwise unreleased memory will cause problems if the screen saver is run repeatedly.

A proper screen saver will hide the mouse cursor when it runs and redisplay it when it exits. To do this you must call the ShowCursor function, which is part of the Windows API. Here is the syntax for declaring this function:

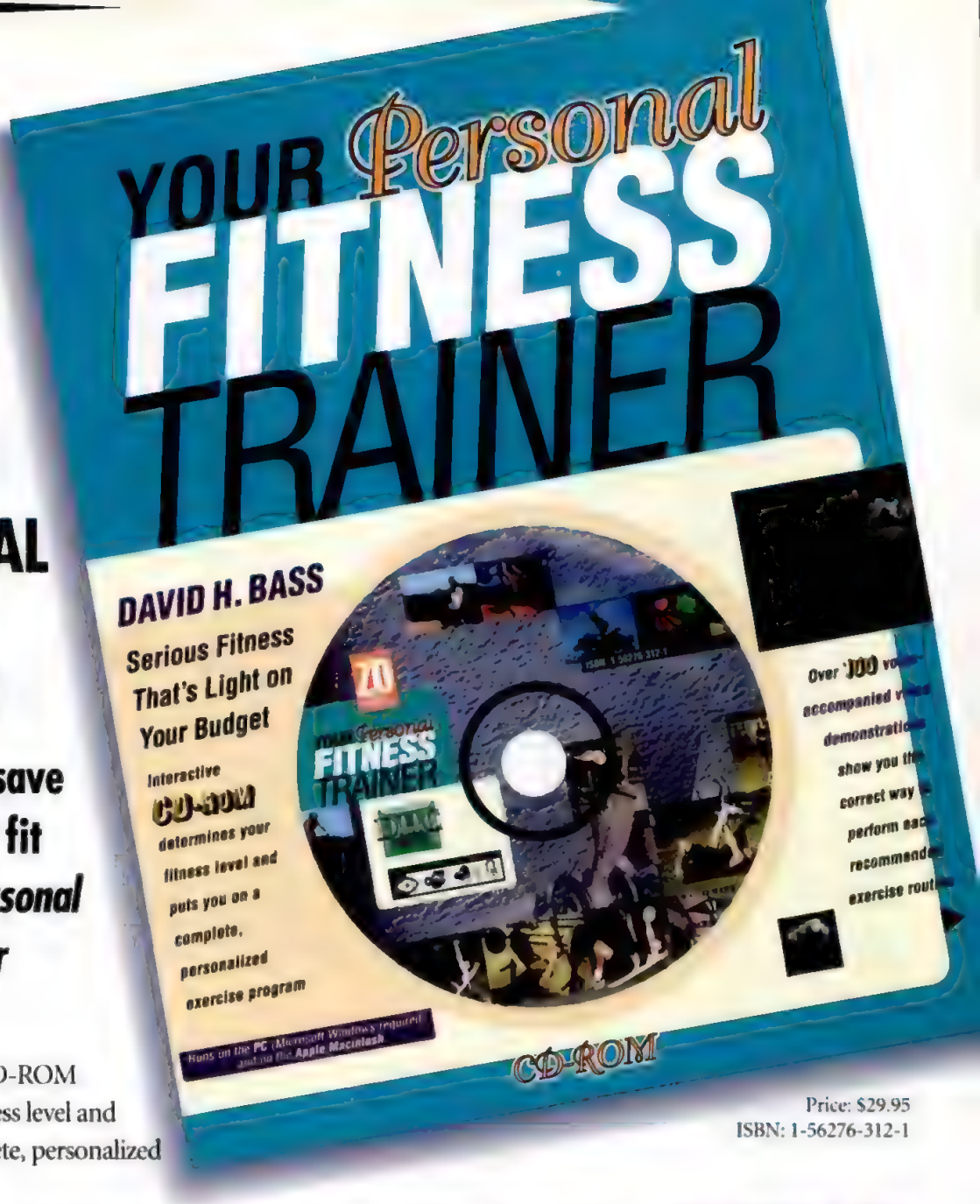
```
Declare Function ShowCursor% Lib
"User"(ByVal bShow%)
```

To show the mouse, simply call ShowCursor with bShow set to True. Hiding the mouse cursor requires a little extra code because of the quirky manner in which the mouse cursor is handled. If ShowCursor is called twice with a value of True, then one call to ShowCursor with a value of False will not hide the cursor. Instead, two calls will be needed. To reliably hide the cursor you can use this HideCursor routine:

```
Sub HideCursor ()
  Do
  Loop Until ShowCursor(False) = True
End Sub
```

PASSWORD PROTECTION Screen savers written in C or C++ can link in a standard screen-saver object library and get automatic access to password encryption. A Visual Basic program like GUIToons has to perform the encryption itself. The EncryptString function in PASSWORD .BAS (see Figure 8) does the job, using the standard Windows encryption algorithm. Note that at no time does GUIToons decrypt your screen-saver password. All it has to do is encrypt the password you entered and see if it results in the same encrypted string as the stored password.

The encryption scheme used by screen savers is based on the simple XOR operation with a twist, implemented as the EXor subroutine. EXor's first parameter can be any number from 0 to 255; its second (a byte from the password string) must be a number that cor-



Make Your Computer

YOUR PERSONAL FITNESS TRAINER

Save money, save time and stay fit with *Your Personal Fitness Trainer* CD-ROM

✔ The Interactive CD-ROM determines your fitness level and puts you on a complete, personalized exercise program

✔ Over 100 voice-accompanied video demonstrations show you the correct way to perform each recommended exercise routine

✔ Runs on the PC (Microsoft Windows required). Apple Macintosh version available.

"...I would highly recommend this program..."

—Coach John C. Phillips, Assistant Strength Coach to the Washington Redskins

Your Personal Fitness Trainer CD-ROM comes with a book that lays out a total fitness philosophy to help you plan and maintain your fitness program.

Available at all fine bookstores or call 1-800-688-0448 ext. 317 for more information.

Price: $29.95
ISBN: 1-56276-312-1

ZIFF-DAVIS ZD PRESS

© 1995 Ziff-Davis Press

responds to a printable ASCII character. These two parameters are XORed. If the result is the ASCII value of a character that is valid for use as part of a key value in an .INI file, EXor replaces the second parameter—the byte from the password string—with that number. If the result would be invalid (a control character, a nonprintable character, or an equal sign, for example), EXor leaves the second parameter unchanged.

EncryptString steps through an uppercase copy of the password string one character at a time, from left to right. It calls EXor to combine the character with the password length, the character's position within the string, and the next character. If the password is more than one character long, EncryptString processes the string again from right to left.

GUIToons gives you the ability to create your own animations, and in the process demonstrates some interesting programming techniques. It was fun to write and fun to write about—we hope you find it fun to use. □

NEIL J. RUBENKING IS TECHNICAL EDITOR OF *PC MAGAZINE*. CARL RANKLIN IS A COMPUTER PROGRAMMER.

GUIDE TO OUR UTILITIES & HOW TO GET THEM

GUIToons

PURPOSE: GUIToons is a Windows screen saver written in Visual Basic. Unlike most screen savers, GUIToons lets you specify which image files to use for display or animation.

USAGE: To install GUIToons, copy GUITOONS.SCR to your Windows directory (usually C:\WINDOWS). If you don't have Visual Basic 3.0 on your system, then you must also copy VBRUN300.DLL and CMDIALOG.VBX to your Windows System directory (usually C:\WINDOWS\SYSTEM).

GUIToons' Setup window is accessed via the Windows Control Panel's Desktop applet. Select GUIToons from the list of screen savers, and then click the Setup button. Select the bitmap file(s) to be used for animation by clicking the Add button.

The Animation Speed slider lets you control how fast the frames are displayed. The Screen Movement slider lets you set how quickly the animated bitmaps move about the screen. With the Background option, you can tell GUIToons to clear the screen before animating or leave it alone. Password protection is optional.

FILES: GUITN.DOC is just the documentation file for GUIToons. GUITN.ZIP contains just the files necessary to run the GUIToons screen saver: the .SCR and .BMP files. GUITSC.ZIP contains all of GUIToons' source code as well as the program files.

SUPPORT: Help for the free utilities offered by *PC Magazine* can be obtained electronically in the Utilities section of ZiffNet's Utilities/Tips Forum (GO ZNT:TIPS). The authors of current utilities generally visit this forum every day. You may find an answer to your question simply by reading the messages previously posted in the forum. If the author is not available and you have a question that the sysops in the forum can't answer, the editor of the Utilities column, who also checks this forum each day, will contact the author or you.

PC Magazine's utilities are available by modem from PC MagNet, our on-line service. PC MagNet is part of ZiffNet, a group of on-line services from Ziff-Davis Interactive. ZiffNet is hosted by CompuServe Information Service.

THE FIRST TIME If you've never used ZiffNet, you'll need to find the access number nearest you. Set your communications software to 7 data bits, even parity, no stop bits, and full duplex. Then dial 800-346-3247 with your modem. When the modem connects, press Enter. At the HOST NAME prompt, enter PHONES. Follow the menus and note the closest access number. Or dial 800-635-6225 (voice) for instructions.

HOW TO JOIN ZIFFNET Dial the local access number. At the HOST NAME prompt, enter CIS. At the USER ID prompt, type 177000,5000. When you see the PASSWORD prompt, enter PC*MAGNET. Finally, when you see the ENTER AGREEMENT NUMBER prompt, enter PCMAG95. Current CompuServe members can type GO PCMAG at any CompuServe ! prompt. Once you enter your billing information, you'll see your personal user ID and temporary password.

MEMBERSHIP PRIVILEGES When you join ZiffNet you will be enrolled in both ZiffNet and CompuServe, for a charge of $13.45 a month. Connect time charges are $4.80 an hour, billed by the minute. Areas free of connect charges for ZiffNet members are PC Magazine Editors' Choice awards, the ZiffNet Magazine Index, Buyers' Resources, Newsbytes, ZiffNet Highlights, and the current Utility (type GO ZNT:FREEUTIL). For ZiffNet member services, call 617-252-5566.

FREE UTILITY Download the current utility free each issue from *PC Magazine*'s BBS at 617-231-4450 or, if you are on the Internet, download our utility from our anonymous FTP server at *ftp.pcmag.ziff.com*.

NO MODEM, NO PROBLEM If you don't have a modem, you can get our utilities by mail. Just send your request with your name, address, and preferred disk size to Public Brand Software, 25 1st St., Cambridge, MA 02141, fax, 317-856-2086.

COPYRIGHT INFORMATION The programs presented in *PC Magazine* can be copied but are copyrighted. You may make copies for others if no charge is involved, but making copies or using any portion for any commercial purpose is strictly prohibited.

PC Solutions

TIPS AND TECHNIQUES TO INCREASE YOUR PRODUCTIVITY

HARDWARE

Shine Your CDs

TIP One of the reasons I upgraded to a Pentium system was the horribly slow and inconsistent performance I was getting with CD-ROM games. Imagine my surprise when I played my favorite game on my new computer and found that the video was stuttering and stopping and the vocals often were out of synch. I checked thoroughly for hardware or software conflicts, but could find none.

On a whim, I carefully checked the data side of the CD-ROM and found several small, almost imperceptible smudges. I didn't think these could make a difference, but I carefully cleaned the CD with a soft cotton cloth and restarted the game. It ran beautifully; the video was smooth, animation and visual sweeps were fluid, and the vocals integrated perfectly. This is hard to believe, but my state-of-the-art technology was brought to its knees by a simple fingerprint.

Dan Wuthrich
Seattle, Washington

▶**PC MAGAZINE:** Mr. Wuthrich's experience is one of the strongest arguments for CD-ROM caddies, those plastic packages that everyone loves to hate. If you can take a CD out of its jewel case (or as is becoming more and more common, its environmentally friendly cardboard sleeve) and plop it immediately into a caddy where it will remain untouched by human hands, you are far less likely to run into this problem.

If your CD-ROM drive is a caddy-less model, or if you don't have enough caddies for all the CDs you use frequently (and I never seem to have enough!), then you need to remember a few important tips about handling CDs.

Perhaps the most important thing to remember is that the data is on the shiny side, not the side with the label. If you have to put a naked disk down on a surface, put it label-side down. That way you are less likely to scratch or mar the data side. It's amazing how often I've seen people who should know better ignore this simple fact.

Next, don't stack unprotected CDs. If you don't have enough jewel cases or caddies for your disks, use the Tyvek disk sleeves or vinyl holders from old 5.25-inch floppy disks. I have an old disk wallet with vinyl pockets that I use to hold my seldom-used and caseless CDs.

Finally, if in spite of being careful to hold them only by their edges, you do get some dirt or a fingerprint on the data surface, don't just grab a paper towel and start scrubbing away. Use only soft, lint-free cloth or cleaning pads. Most stereo and music stores carry cleaning kits for audio CDs that will work just as well for data CDs.—*Alfred Poor*

Mouse Mayhem

❓Every time I turn on my computer, it interferes with TV reception on some channels. The TV is hooked up to a tower antenna (it's not a cable system), and the problem appears to be RF (radio frequency) interference. On the advice of folks on the Utilities/Tips Forum on ZiffNet (GO ZNT:TIPS), I tried disconnecting everything and plugging my peripherals back in one at a time. The problem reappeared only when the mouse was connected. It's admittedly an inexpensive clone, but can this mouse really be the problem?

Karl Paetow
Vaudreuil, Quebec, Canada

▶**PC MAGAZINE:** It is indeed possible, and the fact that your mouse is an inexpensive model deepens my suspicion.

When you send fluctuating currents through a wire, the wire becomes a broadcast antenna for electromagnetic radiation. A good mouse cable will be sufficiently shielded to trap these emissions. An inexpensive mouse may well have been assembled with cheap, unshielded wire. So replacing the mouse with a better-quality unit should take care of the problem.

Incidentally, the emissions from mouse and trackball cables are the reason some airlines have prohibited the in-flight use of any device attached to a laptop. Notebooks with integrated trackballs or other pointing devices are more likely to

PC SOLUTIONS INDEX

Hardware
Shine Your CDs 293
Mouse Mayhem 293
Grappling with Upgrades 303
Printing in Stereo 303
Operating Environments
Keeping a DOS Box Open 304
Creating an Invisible Icon 304
Word Processing
Bookmark Bug in WinWord 6.0 308
Spreadsheets
Function Nesting Wizardy 314
Databases
FoxPro's "Source is Out of Date" Message 316

PC DIRECT

PC DIRECT starts here with exciting offers from top direct vendors.

See index, page 304.

Sowing The Seeds Of Quality
Microsoft
MWM
UP TO
120
MHZ
PENTIUM
intel inside
pentium

And Value

Let's talk about a place called Home . . . The place you'd rather be when you're stuck at the office . . . Where time flies by and every moment counts . . . Where compromise is king and majority rules . . . Where dreams are born and the sound of laughter never dies . . .

—O.K., we won't bore you with flowery phrases, but you've got to admit, your home is a pretty special place! So why settle for anything less from the computer you put in it?

Water, Sunshine And A Whole Lotta Software . . .

That's how our garden of Home PCs grows. We start by jumping on the PCI — giving you the fastest information flow possible. Now we add hot IntelDX2™, Intel DX4™ and Pentium® processors for blazing clock speeds and performance that rocks. Then, just as these systems are starting to sprout, we give them 4-video- and quad-speed CD-ROM drives. And since we've got a green thumb for this multimedia thing, we also sprinkle each Home PC with some of your favorite Microsoft® software.

And While We're On The Subject . . .

Don't you just love software? All it takes is a little bit of the stuff to make an ordinary computer blossom into a prize-winning PC. If you think about it, software is almost like a fertilizer for your system . . . except it smells a lot better. So, what kind of software goes on our *Home PCs*? — We thought you'd never ask! The Microsoft Family Bundle is a veritable *bouquet* of fantastic programs. You'll just *love* digging into CD-ROM titles like Encarta™, Works, Money, Scenes, Dangerous Creatures and Golf. But before you get your hands into dirt — check out some of the other goodies we've planted!

Enjoy Multimedia In Your Own Back Yard

It doesn't take long to realize that multimedia is deeply rooted in these Home PCs. In fact, depending on its configuration, your new power flower may be found "sprouting off" with a 32-voice wavetable sound card and Altec Lansing Speakers! Plus, every Midwest Micro Home PC features a 9624 or 14.4 fax modem with voice-mail that not only sends and receives at speeds up to 57,600 bps, but also acts as a personal answering machine — so you can keep the calls you don't want to take . . . and weed out the ones you do!

It's time to pick a PC called Home . . . The place you'd rather be when you're stuck at the office . . . Where you control fly and every moment talks . . . Where you never have to compromise quality for a low price . . . Where many software are leaders and the sounds from your stereo speakers never die . . .

Caviar
WESTERN DIGITAL

ENHANCED IDE

MIDWEST MICRO

IT'S IN OUR NATURE

Systems
1-800-682-7256
Peripherals
1-800-445-2794

ADV032

Spruce Up Your Working
BOOKSHELF
ENCARTA'95
intel inside
pentium
ENHANCED
IDE
Caviar
"It's darn fast and darn cheap."
— PC Computing, April 1995
"The Elite P5-90 is one of the fastest computers we've tested."
— PC World, January 1995
PC WORLD
TOP 20
Power Desktops

Environment With An Office PC

Let's face it, choosing a business computer is no picnic. That's why we offer a wide range of Office PCs with just the right tools for your business needs. And with one of these systems on ***your*** *side of the fence, work may seem a little less like....* ***work****!*

You Really Need To Get Out More...

And so you shall. Out of an "almost big enough" hard drive and into a roomy alternative. Out of your flimsy warranty program and into MidWest's Real 3 Year coverage. And *definitely* out of that "faster means too expensive" state of mind. We have no intentions of cramping your style. That's why we furnish our Office PCs with the biggest and best of absolutely everything! We're talking hard drive capacities up to 4.3 Gb, modem speeds up to 115,200 bps and enough business software to expand *anyone's* horizons! But before you think about expanding your *budget*, check out our down-to-earth PC prices.

Let's Skip The Formalities

You won't find any bugs in *these* high-performance systems. Every MidWest Micro Office PC features a 32-bit PCI Local Bus for sizzling video and peripheral output. And our *Pentium*™ based Office PCs are *really* breaking new ground with 64-bit video accelerators, 75 MHz, 90 MHz, 100 MHz and 120 MHz processors — even 16 Mb of RAM and up! Who says a serious business computer has to be stuffy?

Find A Shady Spot And Get Back To Work

We guess you could say with an Office PC, your possibilities are **wide open**. Just choose your processor, hard drive, etc. and have a little fun. If a change of scenery sounds good to *you*, don't let the grass grow under your feet — call MidWest Micro and order an Office PC today.

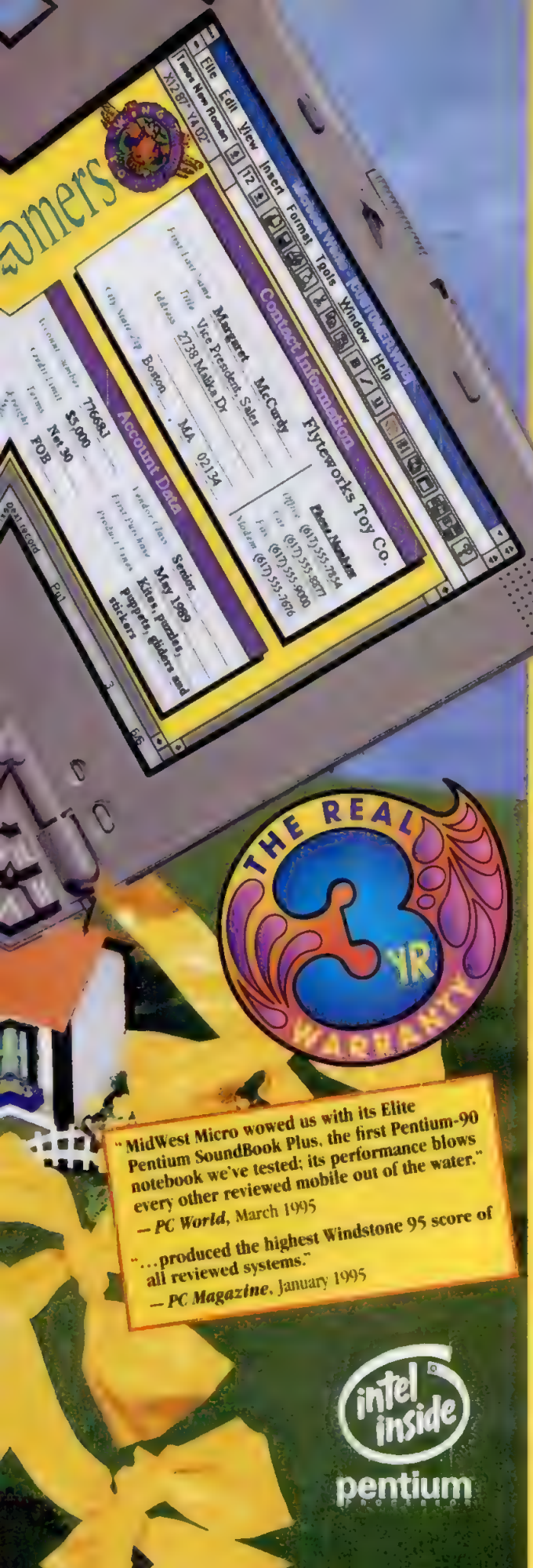
MIDWEST MICRO

IT'S IN OUR NATURE

Systems
1-800-682-7256
Peripherals
1-800-445-2794

AD#G05

New!
PERSONAL
TouchPad
POINTING
DEVICE
Sky-High Performance—
No Strings Attached



Don't...Look...Down...

Why should you? *You're* moving *up* in this fast-paced world. You just need a notebook computer designed for more demanding altitudes. One with so many advanced features, it raises mobile computing to brand new heights. A portable that has no problem whatsoever with clock-tripling speeds up to 100 MHz! A notebook that when left without an outlet in sight replies, "Ten bucks says *you* run out of energy before *I* do."...Well it just so happens, we *have* such a notebook. We like to call it the SoundBook II.

Who Said Anything About The Sky Being The Limit?

We say there shouldn't *be* a limit to what your notebook computer can do! That's why we built the SoundBook II with plenty of ports, 16-bit stereo sound and lightning-fast Intel® processors up to DX4-100! Plus, two convenient RAM compartments make it a breeze to expand this SoundBook's 4 Mb memory to a lofty 36 Mb! And if you think *that* sounds cool, here's something that'll *really* blow your mind.

Winner: Most Congenial

Aside from this SoundBook's countless other talents, it also comes with Personality Modules. These compact peripherals pop in and out of the SoundBook II faster than you can say "My, how convenient!" Just plug your AC adapter or floppy drive into the SoundBook's universal drive bay, and say good-bye to bulky external components! Then choose from additional modules including a 3.5" CD-ROM drive, an extra hard drive and even an extra battery. Speaking of convenience, if tiny trackballs leave you at the end of your rope, you'll love this SoundBook's easy-to-use Personal TouchPad. With this touch-sensitive pointing device, your cursor will never get away from you again!...But your new *notebook* just might — at 6 lbs. the SoundBook II is our lightest SoundBook yet!

Look What Else Just Blew In

Also defying the laws of gravity and speed is the SoundBook Plus based on Intel's Pentium™ Processor. This MidWest favorite features 75 MHz and 90 MHz Pentium Processors coupled with PCI Local Bus Video and hard drive control. And since all our notebooks now come with a three year parts and labor warranty, you're guaranteed our highest level of coverage — no matter which SoundBook you choose. For the best notebooks at the lowest prices, all you need to do is look *up*...our toll-free number, that is. (And since we put it on every page, that shouldn't be too hard.) Call MidWest Micro today — then get ready to grab your new SoundBook and run!

MIDWEST MICRO

IT'S IN OUR NATURE

Systems
1-800-682-7256

Peripherals
1-800-445-2794

AD#G05

MidWest Micro Home PCs

DX2-50 $1499
#008740
- IntelDX2™ 50 Processor
- 4 Mb RAM, 128 Kb Cache
- 545 Mb IDE Hard Drive
- PCI Local Bus Graphics with 1 Mb
- PCI Fast IDE Interface
- Double Speed CD-ROM Drive
- Microsoft® Family Bundle — Encarta™, Works, Money, Scenes, Dangerous Creatures & Golf
- Microsoft Complete Baseball CD
- 16-Bit Stereo Sound Card
- Digital Quality Speakers
- 9624 Fax Modem with Voicemail
- 3.5" Disk Drive
- 15" SVGA .28 Digital Color Monitor
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS® 6.22 and WFW 3.11
- EPA Energy Star Compliant
- The Real 3 Year Warranty

DX2-66 $1599
#008741

DX4-100 $1999
#008703
- IntelDX4™ 100 Processor
- 8 Mb RAM, 128 Kb Cache
- 545 Mb IDE Hard Drive
- PCI Local Bus Graphics with 1 Mb
- PCI Fast IDE Interface
- Double Speed CD-ROM Drive
- Microsoft Family Bundle — Encarta, Works, Money, Scenes, Dangerous Creatures & Golf
- Microsoft Complete Baseball CD
- 16-Bit Stereo Sound Card
- Altec Lansing® Stereo Speakers
- 14.4 Fax Modem with Voicemail
- 3.5" Disk Drive
- 15" SVGA .28 Digital Color Monitor
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- EPA Energy Star Compliant
- The Real 3 Year Warranty

DX4-75 $1899
#008704

P5-75 $2299
#008742
- Intel® 75 MHz Pentium™ Processor
- 8 Mb RAM, 256 Kb Cache
- 850 Mb IDE Hard Drive
- PCI Fast IDE Interface
- PCI Local Bus Graphics with 1 Mb
- Quad Speed CD-ROM Drive
- Microsoft Family Bundle — Encarta, Works, Money, Scenes, Dangerous Creatures & Golf
- Microsoft Complete Baseball CD
- 16-Bit Stereo Sound Card
- Altec Lansing Stereo Speakers
- 14.4 Fax Modem with Voicemail
- 3.5" Disk Drive
- 15" SVGA .28 Digital Color Monitor
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- The Real 3 Year Warranty

P5-60 $2199
#008743

P5-90 $2599
#008744
- Intel 90 MHz Pentium Processor
- 8 Mb RAM, 256 Kb Cache
- 850 Mb IDE Hard Drive
- PCI Fast IDE Interface
- ATI® MACH 64 PCI Accelerator with 2 Mb
- Quad Speed CD-ROM Drive
- Microsoft Family Bundle — Encarta, Works, Money, Scenes, Dangerous Creatures & Golf
- Microsoft Complete Baseball CD
- 16-Bit Wavetable Sound Card
- Altec Lansing Stereo Speakers
- 14.4 Fax Modem with Voicemail
- 3.5" Disk Drive
- 15" SVGA .28 Digital Color Monitor
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- The Real 3 Year Warranty

P5-100 $2799
#008745

P5-100 $3499
#008758
- Intel 100 MHz Pentium Processor
- 16 Mb RAM, 256 Kb Cache
- 1.2 Gb IDE Hard Drive
- PCI Fast IDE Interface
- ATI MACH 64 PCI Accelerator with 2 Mb
- Quad Speed CD-ROM Drive
- Microsoft Family Bundle — Encarta, Works, Money, Scenes, Dangerous Creatures & Golf
- Microsoft Complete Baseball CD
- 16-Bit Wavetable Sound Card
- Altec Lansing Stereo Speakers with Subwoofer
- 14.4 Fax Modem with Voicemail
- 3.5" Disk Drive
- 17" .28 Digital Color Monitor
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- The Real 3 Year Warranty

P5-90 $3199
#008759

P5-120 $3799
#008760

PC MAGAZINE EDITORS' CHOICE Dec 6, 1994 ATI Graphics XPRESSION

ATI

PC Magazine TOP 20 Power Desktops

energy star EPA POLLUTION PREVENTER

THE REAL 3 YR WARRANTY

MidWest Micro Office PCs

DX2-50 PCI $1199
#008746
- IntelDX2 50 Processor
- 4 Mb RAM, 128 Kb Cache
- 545 Mb IDE Hard Drive
- PCI Fast IDE Interface
- PCI Local Bus Graphics with 1 Mb
- 3.5" Disk Drive
- 14" SVGA .28 NI Color Monitor
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS-DOS 6.22 and WFW 3.11
- MS® Works for Windows™ 3.0
- EPA Energy Star Compliant
- The Real 3 Year Warranty

DX2-66 PCI $1299
#008747

DX2-50 PCI $1499
#008713
- IntelDX2 50 Processor
- 4 Mb RAM, 128 Kb Cache
- 545 Mb IDE Hard Drive
- PCI Fast IDE Interface
- PCI Local Bus Graphics with 1 Mb
- Double Speed CD-ROM Drive
- 9624 Fax Modem with Voicemail
- 3.5" Disk Drive
- 15" SVGA .28 Digital Color Monitor
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- 101-Key Enhanced Keyboard
- High-Resolution Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Word 6.0, Bookshelf® '94, Encarta, Works Multimedia Edition 3.0 & Money 3.0
- EPA Energy Star Compliant
- The Real 3 Year Warranty

DX2-66 PCI $1599
#008714

DX4-75 PCI $1799
#008715
- IntelDX4 75 Processor
- 8 Mb RAM, 128 Kb Cache
- 545 Mb IDE Hard Drive
- PCI Fast IDE Interface
- PCI Local Bus Graphics with 1 Mb
- Double Speed CD-ROM Drive
- 14.4 Fax Modem with Voicemail
- 3.5" Disk Drive
- 15" SVGA .28 Digital Color Monitor
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Word 6.0, Bookshelf '94, Encarta, Works Multimedia Edition 3.0 & Money 3.0
- EPA Energy Star Compliant
- The Real 3 Year Warranty

DX2-66 PCI $1749
#008716

DX4-100 PCI $1899
#008717

OFFICE

intel inside pentium

ENHANCED IDE

Caviar WESTERN DIGITAL

TestDrive SUPER STORE

All Systems with a CD-ROM include TestDrive CD Software and Microsoft Home CD Sampler

MidWest Micro Office PCs (Continued)

DX4-100 PCI $1999
#008718
- IntelDX4 100 Processor
- 8 Mb RAM, 128 Kb Cache
- 850 Mb IDE Hard Drive
- PCI Fast IDE Interface
- PCI Local Bus Graphics with 1 Mb
- Double Speed CD-ROM Drive
- 14.4 Fax Modem with Voicemail
- 3.5" Disk Drive
- 15" SVGA .28 Digital Color Monitor
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Word 6.0, Bookshelf '94, Encarta, Works Multimedia Edition 3.0 & Money 3.0
- EPA Energy Star Compliant
- The Real 3 Year Warranty

P5-75 $1999
#008748
- Intel 75 MHz Pentium Processor
- 8 Mb RAM, 256 Kb Cache
- 545 Mb IDE Hard Drive
- PCI Fast IDE Interface
- PCI Local Bus Graphics with 1 Mb
- Quad Speed CD-ROM Drive
- 3.5" Disk Drive
- 15" SVGA .28 Digital Color Monitor
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Word 6.0, Bookshelf '94, Encarta, Works Multimedia Edition 3.0 & Money 3.0
- The Real 3 Year Warranty

P5-60 $1899
#008749

P5-75 $2399
#008750
- Intel 75 MHz Pentium Processor
- 16 Mb RAM, 256 Kb Cache
- 850 Mb IDE Hard Drive
- PCI Fast IDE Interface
- PCI Local Bus Graphics with 1 Mb
- Quad Speed CD-ROM Drive
- 14.4 Fax Modem with Voicemail
- 3.5" Disk Drive
- 15" SVGA .28 Digital Color Monitor
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Word 6.0, Bookshelf '94, Encarta, Works Multimedia Edition 3.0 & Money 3.0
- The Real 3 Year Warranty

P5-90 $2499
#008751
- Intel 90 MHz Pentium Processor
- 8 Mb RAM, 256 Kb Cache
- 545 Mb IDE Hard Drive
- PCI Fast IDE Interface
- ATI MACH 64 PCI Accelerator with 2 Mb
- Quad Speed CD-ROM Drive
- 14.4 Fax Modem
- 3.5" Disk Drive
- 15" SVGA .28 Digital Color Monitor
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Office Professional, Bookshelf
- The Real 3 Year Warranty

P5-100 $2999
#008752
- Intel 100 MHz Pentium Processor
- 16 Mb RAM, 256 Kb Cache
- 1 Gb IDE Hard Drive
- PCI Fast IDE Interface
- ATI MACH 64 PCI Accelerator with 2 Mb
- Quad Speed CD-ROM Drive
- 3.5" Disk Drive
- 15" SVGA .28 Digital Color Monitor
- 8-Bay Mini-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Signature 101-Key Enhanced Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Office Professional, Bookshelf '94
- The Real 3 Year Warranty

P5-100 $3399
#008753
- Intel 100 MHz Pentium Processor
- 16 Mb RAM, 256 Kb Cache
- 1 Gb IDE Hard Drive
- PCI Fast IDE Interface
- ATI MACH 64 PCI Accelerator with 2 Mb
- Quad Speed CD-ROM Drive
- 14.4 Fax Modem with Voicemail
- 3.5" Disk Drive
- 17" .28 Digital Color Monitor
- 10-Bay Full-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Microsoft Natural Keyboard
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Office Professional, Bookshelf '94
- The Real 3 Year Warranty

P5-90 $3199
#008754

P5-100 $3999
#008761
- Intel 100 MHz Pentium Processor
- 16 Mb RAM, 256 Kb Cache
- 1.2 Gb IDE Hard Drive
- PCI Fast IDE Interface
- ATI MACH 64 PCI Accelerator
- Quad Speed CD-ROM Drive
- Altec Lansing Stereo Speakers
- 28.8 S/R Fax Modem
- 3.5" Disk Drive
- 17" .26 1600 x 1200 ExactMatch Color Monitor
- 10-Bay Full-Tower Case
- 4 ISA, 2 PCI & 1 PCI/ISA Slots
- Super I/O using 16550 UART & ECP/EPP
- Microsoft Mouse
- MS-DOS 6.22 and WFW 3.11
- MS Office Professional, Bookshelf '94 & Encarta
- The Real 3 Year Warranty

P5-90 $3799
#008762

P5-120 $4299
#008763

Customizing Your System
If you don't see a system configuration which meets your needs, we'll be glad to customize a system for you. Choose your own case design, amount of RAM, hard drive size and other add-ons such as modems and multimedia kits.

MIDWEST MICRO
IT'S IN OUR NATURE
Systems
1-800-682-7256
Peripherals
1-800-445-2794

AD#G05

MidWest Micro SoundBook Plus Based On Intel's Pentium™ Processor

- Intel® Pentium™ 90 or 75 MHz Processor
- 64-Bit, 256k Synchronous Burst External Cache
- 64-Bit, 8 Mb RAM (expands to 40 Mb)
- 10.3" Dual-Scan or 10.4" Active-Matrix VGA Display
- PCI Local Bus Video with 1 Mb Video RAM
- PCI Local Bus HDD Controller
- 16-Bit Stereo Audio (Sound Blaster & Windows™ Sound System Compatible)
- Built-in Stereo Speakers & Microphone
- External Jacks for Line In & Line Out
- 3.5" Built-in Disk Drive
- User Replaceable Hard Drive
- Two Type II/One Type III PCMCIA Slot
- Integrated Pointing Device
- NiMH Battery & AC Adapter
- Advanced Power Management
- Bi-directional Parallel Port
- High Speed 16550 UART Serial Port
- Infra Red Wireless "IR" Interface
- External VGA & Keyboard/Mouse Port
- MS-DOS® 6.22 & WFW 3.11
- Microsoft® Works for Windows 3.0 & Golf
- Lotus® Organizer
- Weight: 6.8 lbs
- Carrying Case
- The Real 3 Year Warranty

intel inside pentium

Dual-Scan Color

P5-75 with 340 Mb HDD
#008090 **$2999**

P5-90 with 340 Mb HDD
#008029 **$3299**

P5-90 with 520 Mb HDD
#008025 **$3499**

P5-90 with 720 Mb HDD, 16 Mb of RAM & PCMCIA 14.4 Fax Modem
#008101 **$3999**

Active-Matrix Color

P5-75 with 340 Mb HDD
#008091 **$3999**

P5-90 with 520 Mb HDD & 16 Mb of RAM
#008027 **$4799**

P5-90 with 720 Mb HDD, 16 Mb of RAM & PCMCIA 14.4 Fax Modem
#008102 **$4999**

P5-90 with 720 Mb HDD, 32 Mb of RAM & PCMCIA 14.4 Fax Modem
#008103 **$5799**

Options

8 Mb RAM Card	#002558	$379
16 Mb RAM Card	#002559	$739
Mobile Max PCMCIA 130 Mb HDD	#004805	$289
Mobile Max PCMCIA 170 Mb HDD	#004806	$345
PCMCIA 14.4 Fax Modem	#002624	$129
PCMCIA Combo Ethernet Adapter	#001954	$139
Leather Carrying Case	#001515	$ 99

• Ask your MidWest Micro sales representative about additional hard drive, screen and processor options

MidWest Micro SoundBook II

- Intel 486™, IntelDX2™ or IntelDX4™ Processor with SMM Support
- Modular Design with Personality Modules
- 4 Mb RAM (expands to 36 Mb)
- 10.3" Dual-Scan or 10.2" Active-Matrix VGA Display
- Local Bus Video with 1 Mb Video RAM
- 16 Bit Audio Features Including Built-in Microphone & Stereo Speakers, External Jacks for Line-In & Line-Out, Soundblaster & WSS compatible
- 3.5" Floppy Disk Drive
- Two Type II/One Type III PCMCIA Slot
- Personal TouchPad Integrated Pointing Device
- NiMH Battery & AC Adapter
- Advanced Power Management
- One Parallel & One Serial Port
- External VGA & Keyboard Port
- MS-DOS 6.22 & WFW 3.11
- Microsoft Works for Windows 3.0 & Golf
- Lotus Organizer
- Weight: 6.0 lbs
- Carrying Case
- The Real 3 Year Warranty

Dual-Scan Color

DX2-50 with 340 Mb HDD
#008104 **$1999**

DX2-66 with 520 Mb HDD & 8 Mb of RAM
#008105 **$2499**

DX4-75 with 520 Mb HDD & 8 Mb of RAM
#008106 **$2599**

DX4-100 with 520 Mb HDD, 8 Mb of RAM & PCMCIA 14.4 Fax Modem
#008107 **$2799**

DX4-100 with 720 Mb HDD & 8 Mb of RAM
#008108 **$2999**

DX4-100 with 720 Mb HDD, 16 Mb of RAM & PCMCIA 14.4 S/R Fax Modem
#008109 **$3299**

Active-Matrix Color

DX2-66 with 340 Mb HDD
#008110 **$2799**

DX4-75 with 520 Mb HDD & 8 Mb of RAM
#008111 **$3299**

DX4-100 with 520 Mb HDD & 16 Mb of RAM
#008112 **$3799**

DX4-100 with 720 Mb HDD, 16 Mb of RAM & PCMCIA 14.4 Fax Modem
#008113 **$3999**

Options

Personality Modules—AC Adapter, Battery, 3.5" CD-ROM		CALL
4 Mb RAM Card	#006381	$309
8 Mb RAM Card	#002558	$379
16 Mb RAM Card	#002559	$739
Mobile Max PCMCIA 130 Mb HDD	#004805	$289
Mobile Max PCMCIA 170 Mb HDD	#004806	$345
PCMCIA 14.4 Fax Modem	#002624	$129
PCMCIA Combo Ethernet Adapter	#001954	$139
Leather Carrying Case	#001515	$ 99

Disclaimer: Intel, the Intel Inside logo, and Pentium are trademarks and registered trademarks of Intel Corporation. Microsoft, MS, MS-DOS, Bookshelf, Encarta, Windows and the Windows logo, Bob and the Bob logo are trademarks and registered trademarks of Microsoft Corporation. The Energy Star emblem does not represent EPA endorsement of any product or service. All products are trademarks of their respective manufacturers. All registered and unregistered trademarks are the sole property of their respective companies.

Policy: No service charge for credit card orders. Prices are subject to change. Repair or replacement of defective products is at MidWest Micro's discretion. We are not responsible for errors in typography and photography. Original shipping and handling fees, as well as return shipping charges, are non-refundable. There are no returns for credit after 30 days. All returns must be shipped in original packaging. Call or write MidWest Micro for more information on warranties and policies.

MIDWEST MICRO

IT'S IN OUR NATURE

6910 U.S. Route 36 East, Fletcher, Ohio 45326

1-800-682-7256

Fax: 1-800-562-6622

Monday - Friday 9 a.m. to 7 p.m. Saturday 10 a.m. to 4 p.m.

For your protection we check thoroughly for stolen credit cards.

Technical Support:
1-800-262-6622

Customer Service:
1-800-728-8584

Dealers Call:
1-800-682-0522

Faxback:
1-800-445-2025

AD#G05

CIRCLE 398 ON READER SERVICE CARD

be properly shielded, since they don't have cables dangling from their ports.
—*Alfred Poor*

Grappling with Upgrades

❓I have an older 386DX/25-based system with 8MB of RAM and a 200MB hard disk. Though I realize it's a dinosaur, I'm trying to extend its life long enough to skip a generation of PCs. I use Windows-based programs and was wondering if I'd get a significant performance boost by replacing my Trident-based VGA card with an accelerated card costing about $120 to $180.

Bill Rich
via ZiffNet

▶**PC MAGAZINE:** You'll get more bang for your buck elsewhere than by going for an accelerated ISA card at this point. (And by my count, you've already skipped a few generations of PCs, though I can certainly understand your desire to keep your machine functioning a bit longer.)

The problem is that the ISA bus runs at 8 MHz and is only 16 bits wide. You can speed up the processing of data on the graphics adapter and pare down the data stream flowing to the card through the use of an accelerator chip, but there are limits to the gains you can make in this way.

CPU power is cheap, and a faster CPU will affect all aspects of your system performance—not just the display. Assuming that you can use your existing components (memory, disk controller, and so forth), you can get a 486SX/33-based motherboard with VL-Bus expansion slots for less than $150. You can get a local-bus SVGA card for about $100. Thus for a bit more than the price of an accelerator card, you'll get a CPU running a third faster than you have now and a path to the graphics adapter that is twice as wide and three times as fast as that of your current configuration.

Another advantage to this approach is that it gives you further relatively inexpensive yet effective upgrade options. You can replace the 486SX/33 with a 486DX2/66 for doubled CPU performance. Or you can add an accelerated VL-Bus graphics adapter or local-bus disk controller. By comparison, buying new components for a 386-based ISA-bus motherboard is a dead-end approach.
—*Alfred Poor*

Our Advisors

Douglas Boling is a contributing editor and the author of many utilities, including MBOOT.COM and EMS40.SYS.
Frank J. Derfler, Jr., is senior networking editor and the author of the *PC Magazine Guide to Connectivity.*
Alfred Poor is a contributing editor and the author of *New Life for Old PCs.*
Jeff Prosise is a contributing editor and the author of *DOS 6 Techniques & Utilities.*
Sal Ricciardi is a contributing editor and the author of the *Running FoxPro* books from Microsoft Press.
Neil Rubenking is technical editor and author of *Can Do DOS, Can Do Windows,* and *PC Magazine Batch File Lab Notes.*
Joe Salemi is a contributing editor and author of the *PC Magazine Guide to Client/Server Databases.*
Luisa Simone is a contributing editor and the author of the book *Microsoft Publisher.*
Craig Stinson is a contributing editor and coauthor of *Running Windows 3.1* and *Running Microsoft Excel.*
M. David Stone is a contributing editor and coauthor of *Word for Windows Companion,* Second Edition.
Ethan Winer is a contributing editor and the author of *PC Magazine BASIC Techniques and Utilities.*

HOW TO CONTACT US

Do you have a hardware, software, or systems problem you can't solve? Do you have a tip you think other readers could use? Perhaps you'd like a better understanding of how something works. If so, we invite you to tell us about it. Our experts can give you practical solutions to your problems, provide techniques for using your software and hardware more productively, and help you grasp computer concepts and understand the latest technology.

It's easy to contact us. Just send us your submission (use ASCII format for text files) via the medium that's most convenient for you:

U.S. Mail: Solutions, *PC Magazine,* One Park Ave., New York, NY 10016-5802. (Please send a floppy disk along with a printout.)
Fax: 212-503-5799.
MCI Mail: Solutions, 556-3896
CompuServe: 72241,104.
Internet: 556.3896@mcimail.com.
PC MagNet: Select Submissions to *PC Magazine* from the main PC MagNet menu. Upload your file to the most appropriate library. If at any time you need help, simply type a question mark (?) and hit Enter; a list of commands will be displayed. If you are not already a member of PC MagNet but would like to join, follow the instructions on page 12 to find your local access number.
CompuServe Members: If you're a CompuServe member, you can join PC MagNet by typing GO PCMAG at any CIS prompt.

For any tip we print, you'll receive $50 plus a *PC Magazine* T-shirt. We regret that we cannot answer letters individually.

Printing in Stereo

❓Whenever I print, the sound of my ink jet printer comes through the speakers attached to my sound card. It's so bad that I have to unplug them every time I print something. How can I stop this from happening?

John Thayer
via the Internet

▶**PC MAGAZINE:** This sounds like a shielding problem: Your speakers are almost certainly self-powered and will amplify any weak signal that is picked up by the speaker wires. It is unlikely that the printer itself is the source of the interference, so focus on the cables as the first step toward a solution.

First and foremost, check to see how the cables are routed. Do not twist or tie the speaker and printer cables together as they leave the computer for their respective destinations. If possible, route the cables so that they do not go near each other.

Make certain that the printer cable is

solidly grounded at both ends. Use the connector clips at the printer end and the hand screws at the computer end to make sure that you have a firm connection.

If the problem persists, try replacing the printer cable or the speaker cables or both with better-quality cable that provides more thorough shielding.
—Alfred Poor

OPERATING ENVIRONMENTS

Keeping a DOS Box Open

❓I was under the impression that the "Close Window on Exit" check box in the Windows .PIF file editor serves the same purpose as loading COMMAND.COM (with or without /K) in a batch file run from Windows, as discussed in the Solutions column of January 25, 1994. Is this correct?

John Fitzpatrick
via ZiffNet

▶**PC MAGAZINE:** The .PIF file editor's Close Window on Exit check box does nothing but control the status of a DOS box's window after the application it contains has ended. If this item is checked, the DOS box will vanish when the program ends. If not, the DOS box will remain open but inactive, with the word "Inactive" prefixed to its window title. This is convenient if the program in question was a batch file or command-line utility: If the DOS box closed the moment the program ended, you might not get a chance to view the results.

When you run a batch file under Windows by specifying a command line of `COMMAND /K` followed by the batch file name, you will have a live DOS box after the batch file ends. You can run other programs or DOS commands, and the DOS box will remain open until you enter the EXIT command. Again, the benefit of this technique is that it gives you the opportunity to automatically load TSRs in just one DOS box. The alternative is to load your TSRs before starting Windows, in which case they will take away from the conventional memory available to all processes.
—Neil J. Rubenking

Creating an Invisible Icon

❓I'd like to know how to make a Windows icon invisible. My plan is this: Since Windows minimizes icons into the lower left corner of the screen, I'd still be able to locate an invisible Program Manager icon with a minimum of double-clicking. I could set up a Windows batch file to run the applications I want, and in between, no icons would appear on the screen to clutter up my customized wallpaper. Can you tell me how to create an icon that is completely transparent? I'd like the title to be transparent as well. This may be a little unconventional, but I'd like to do it.

Vernon Caswell
via ZiffNet

▶**PC MAGAZINE:** Every Windows icon is rectangular, though many of them don't look that way. For example, Windows' Write icon is a pen drawing the letter A, and you can see the desktop background surrounding the pen. That's because the

SOFTWARE • PERIPHERALS • SYSTEMS • COMPONENTS • TOLL-FREE • ADVICE
SPEED • SERVICE • SUPPORT • VALUE • QUALITY

PC DIRECT

Premier Superstores
Top Direct Marketers
Manufacturers of
Systems, Software,
and Peripherals

If it's sold direct,
you'll find it here.

INDEX

SYSTEMS
AMS 348
COMPUTER DISCOUNT WAREHOUSE 317
Comtrade 305
FOSA 343
INSIGHT DIRECT, INC. 346, 388
Midwest Micro Peripherals 294
MPC Technology 330
PCs Compleat 333
PerComp Microsystems, Inc. 310,315
Samsung 322
USA Flex 336

SOFTWARE/PERIPHERALS/COMPONENTS
American Small Business 344
Arlington Computer Products 312
COMPUTER DISCOUNT WAREHOUSE 317
First Source International 327
H. Co Memory Upgrades 307
INSIGHT DIRECT, INC. 346,388
LA Trade 332
Megahaus 351
Micro Solutions 326
Micron Computer, Inc 342
Midwest Computer Works 340
Mitra 325
PC Connection 338
Princeton Graphics Systems 306
Samsung 322
SPSS, Inc. 309
Sunshine Computers 345

SOFTWARE • PERIPHERALS • SYSTEMS • COMPONENTS • TOLL-FREE • ADVICE
SPEED • SERVICE • SUPPORT • VALUE • QUALITY

MEMORY • PCMCIA • HARD DRIVES

H.Co. Is Pleased To Announce That Our Memory Is Covered By All IBM On-Site Warranties, And Maintenance Agreements, Including EasyServ

DESKTOP UPGRADES

AST

Advantage Plus 486 DX/33, DX2/50, DX2/66
- 4MB MD ... $159
- 8MB MD ... $307

Advantage Pro 486/33, SX/25, Bravo LC
- 4MB MD ... $150
- 16MB MD ... $545

Bravo LC 4/66d,50d,33,33e,25s
- 4MB MD ... $155
- 8MB KIT ... $202
- 16MB MD ... $545

Premmia
- 4MB KIT ... $188
- 8MB KIT ... $355
- 16MB KIT ... $709
- 32MB KIT ... $1209

Prem Serv SE 4/33 8MB KIT ... $339

Prem 386/33TE, 486/25TE, 486/33TE
- 8MB KIT ... $339

Prem II 386/25, 33, 486/33, 486SX/20
Premium 486/25, 25E, 33, 33E
- 8MB KIT ... $339

Cupid Exp. 0MB BD ... $149

NEC

Image/Ready 486/25, 33, 66
- 4MB MD ... $148
- 16MB MD ... $557

PM SX,SX PLUS
- 2MB BD ... $209
- 4MB BD ... $295
- 8MB BD ... $545

PM 386SX/20, 20e, 16, 25, 486/50, 33
- 8MB KIT ... $389

PM 386/33E, 486/25E
- 2MB MD ... $140

PM 386/33i, Express Te, e Series
- 4MB MD ... $175
- 16MB MD ... $809

COMPAQ

ProSignia, Presario 4MB MD ... $175
- 8MB MD ... $309

Presario 500, 700, 900
- 4MB MD ... $159
- 8MB MD ... $317
- 16MB MD ... $545
- 32MB MD ... $1021

ProLiant 2000, 4000, SystemPro XL
- 16MB KIT ... $710
- 32MB KIT ... $1427
- 64MB KIT ... $2439
- 128MB KIT ... $4599

ProLinea MT/MTE, ProSignia VS. Presario 600/800, ProLinea 4/25, 4/33, 4/50, 4/66
- 2MB MD ... $95
- 4MB MD ... $175
- 8MB MD ... $309

DP 386/33,486/25,33,System Pro
- 2MB MD ... $105
- 8MB MD ... $369

IBM

Aptiva 300, 500, 700
- 4MB MD ... $159
- 16MB MD ... $509

50Z,56SX,LS,66SX,LS,70-E61,70-121,P-70
- 2MB MD ... $80

55SX,LS,65SX,LS 4MB MD ... $175

70-A21,70-A61,70-B21,70-B61
- 2MB MD ... $80

30/286 2MB KIT ... $80

57,57SX,90,95 4MB MD ... $179
- 8MB MD ... $344

OTHERS

ALR	ALL MODELS	CALL
Apple	ALL MODELS	CALL
Canon	ALL MODELS	CALL
Dell	ALL MODELS	CALL
Hewlett-Packard	ALL MODELS	CALL
Sun	ALL MODELS	CALL
Zenith	ALL MODELS	CALL

LAPTOP UPGRADES

TOSHIBA

T2400
- 4MB ... $185
- 8MB ... $355

T2200SX,T2000SX,SXE,T1800,T1850,T1000SE
- 4MB ... $188
- 8MB ... $319

T3400
- 4MB ... $229
- 8MB ... $349
- 16MB ... $649

T3100SX, T3200SV,SXC
- 4MB ... $149

T5200, T5200C, T5400, T8500
- 2MB ... $89
- 8MB ... $349

T4400,T6400,T3300
- 4MB ... $185
- 8MB ... [illegible]
- 16MB ... [illegible]

T4400,T6400
- 8MB ... [illegible]
- 16MB ... [illegible]

T1900, T1950, T4500, T4600, T4700, T4800 & T4900
- 4MB ... $189
- 8MB ... $379
- 16MB ... $729

IBM

IBM RECOMMENDED

L40SX, N51
- 4MB ... $147
- 8MB ... $289

CL57SX, Thinkpad 510, 700, 700C, 720, 720C
- 4MB ... $209
- 8MB ... $389

Thinkpad 220, 230Cs
- 4MB ... $239
- 8MB ... $410

Thinkpad 300 8MB ... $365

Thinkpad 340, 355, 360, 730
- 4MB ... $189
- 8MB ... $320
- 16MB ... $655

Thinkpad 710T
- 4MB ... $185
- 8MB ... $317

PS Note
- 2MB ... CALL
- 4MB ... CALL
- 8MB ... CALL

PS Note 486
- 4MB ... CALL
- 8MB ... CALL
- 16MB ... CALL

Ultra Lite Versa
- 4MB ... $225
- 8MB ... $399
- 16MB ... $799

UltraLite II,SL/25c
- 2MB ... $129
- 4MB ... $219
- 8MB ... $359

UltraLite SL/20,SL/20P
- 4MB ... $197
- 6MB ... $257

COMPAQ

Aero, Concerto 486
- 4MB ... $219
- 8MB ... $379

Contura 400
- 4MB ... $181
- 8MB ... $369
- 16MB ... $655

Contura 4/25 Series
- 4MB ... $189
- 8MB ... $299
- 16MB ... $639

LTE Lite/20,25,25c
- 4MB ... $215
- 8MB ... $395

LTE Lite 4/25c
- 4MB ... $215
- 8MB ... $399

LTE Elite
- 4MB ... $175
- 8MB ... $319
- 16MB ... 599

NEC

Versa S
- 4MB ... $195
- 8MB ... $319

CANON

CANON RECOMMENDED

NoteJet 486 50C, 75C
- 4MB ... $249
- 8MB ... $409
- 16MB ... $779

NoteJet 486 (Original), NoteJet II 486C
- 4MB ... $199
- 8MB ... $369

NoteJet 486-33, 33c, 25c, Innova 486 NX
- 4MB ... $239
- 8MB ... $389

OTHERS

Apple Powerbooks	ALL MODELS	CALL
TI TravelMate 4000	4MB	$189
	16MB	CALL
AST Ascentia 800n	4MB	$185
	8MB	$359
	16MB	$689

[illegible]
- 8MB ... $355
- 16MB ... $809

AST PremExec 4MB ... $159

AST PowerExec
- 4MB ... $179
- 16MB ... $769

AST Bravo NB 486
- 4MB ... $205
- 16MB ... $947

STANDARD SIMM MODULES

1X9-70	$38	1X36-70	$141
1X9(3)-60	$38	2X36-70	$295
1X9(3)-70	$36	4X36-70	$549
4X9-70	$127	8X36-70	$1099
16X9-70	$569	1X32-70	$140
1X8-70	$37	2X32-70	$289
4X8-70	$122	4X32-70	$519

H.Co. is licensed to manufacture memory modules by Wang Laboratories, the inventor of standard PC simms!

IF YOUR MACHINE IS NOT LISTED GIVE US A CALL

H.Co. STOCKS THOUSANDS OF UPGRADE ITEMS FOR ALL LEADING SYSTEMS

PRINTER UPGRADES

Brother	ALL MODELS	CALL
Canon	ALL MODELS	CALL

Epson Action Laser II, EPL 8000
- 2MB MD ... $129
- 4MB MD ... $205

Epson EPL 6000 4MB MD ... $189

HP Laserjet II, IID, IIP, III, IIID
- 2MB BD ... $95
- 4MB BD ... $169

HP Laserjet 4L 1MB MD ... $49

HP Laserjet 4, 4M, 4P, 4si, 4siMX IIsi,XL-300,DJ 1200C, Design Jet 800
- 4MB ... $179
- 8MB ... $351

HP Deskjet 500,500C,520,520C550C,560,560C
- 256K MD ... $59

IBM 4019, 4019e
- 2MB MD ... $109
- 3.5MB MD ... $189

IBM 4029, 4039, 4079
- 2MB BD ... $89
- 4MB BD ... $159

NEC Silent Writer 95, 97
- 2MB BD ... $100

Oki Lasers ALL MODELS ... CALL

Panasonic 4420, 4450i, 4410, 4430
- 2MB MD ... $119
- 4MB MD ... $189

HARD DRIVES

CONNER

- 420MB IDE 13MS ... $225
- 540MB IDE 12MS ... $285
- 850MB IDE 12MS ... $390

QUANTUM

- 540MB IDE 12MS ... $275
- 730MB IDE 11MS ... $340
- 1.08GB SCSI 10MS ... $599

SEAGATE

- 420MB IDE 12MS ... $205
- 540MB IDE 10MS ... $265
- 1.08GB IDE 10MS ... $495
- 2.1GB SCSI 9MS ... $1295

WESTERN DIGITAL

- 420MB IDE 13MS ... $215
- 540MB IDE 12MS ... $270
- 730MB IDE 12MS ... $325
- 1.08GB IDE 9MS ... $505

$1 FedEx
Two-Day Service For Orders Over $500
$5 For Orders Under $500

2.5" NOTEBOOK DRIVES

- 340MB IDE 12MS ... $330
- 520MB IDE 11MS ... $505

PCMCIA

SRAM

- 1MB SRAM Card ... $135
- 2MB SRAM Card ... $239

FLASH

- 2MB Flash Card ... $159
- 4MB Flash Card ... $229
- 8MB Flash Card ... $389
- 16MB Flash Card ... $599

HARD DRIVES

- 171MB Type III ... $469
- 260MB TYPE III ... $719

FAX MODEMS

- 9600/2400 ... $89
- 14.4/14.4 ... $159
- 28.8/14.4 ... $299

PERIPHERALS

- 10-Base T Network Adaptor ... $149
- Internal Desktop Card Reader ... $139
- SCSI II PCMCIA Adaptor ... $189

CPU UPGRADES

ADD AN H.CO. GO-486! CPU UPGRADE AND INCREASE YOUR SYSTEMS PERFORMANCE BY UP TO 500%

H.CO. GO-486! UPGRADES

IMPROVE PERFORMANCE UP TO 500%

- 286 (6-16 MHZ) IBM 486 50 MHZ ... $229
- 286 (6-16 MHZ) IBM 486 66 MHZ ... $279
- 386SX-16/20 (X2) TI 486 32/40 MHZ ... $229
- 386DX 16/20 (X2) TI 486 32/40 MHZ ... $229
- 386DX 25 MHZ (X2) TI 486 50 MHZ ... $249
- 386SX 33 MHZ (X2) IBM 486 66 MHZ ... $349
- 386DX 33 MHZ (X2) IBM 486 66 MHZ ... $399
- 386SX 16/20/25 (X3) IBM 486 49/60/75 MHZ ... $319
- 386DX 16 &20 MHZ (X3) IBM 486 60 MHZ ... $329
- 386DX 25 MHZ (X3) IBM 486 75 MHZ ... $399
- 386DX 33 MHZ (X3) IBM 486 99 MHZ ... $565

TI PROCESSOR UPGRADES

- 386DX 33 MHZ (X1) TI 486 33 MHZ ... $129
- 386DX 40 MHZ (X1) TI 486 40 MHZ ... $149

INTEL PROCESSOR UPGRADES

- 486DX/SX 33 MHZ (X3) 486-100 MHZ ... $309
- 486DX/SX-25 MHZ (X3) 486-75 MHZ ... $239
- 486DX/SX 33 MHZ (X2) 486-66 MHZ ... $189
- 486DX/SX-25 MHZ (X2) 486-50 MHZ ... $169

H.Co. Computer Products Has America's Largest Selection Of Memory Products, And We'll Beat Any USA Advertiser's Price!

CALL TOLL FREE 800•346•7172

INTERNATIONAL 714•833•3222 • FAX 714•833•3389

The H.Co. Advantage

- Lifetime Warranty On Memory
- 30-Day Money Back Guarantee
- Memory Assembled In USA
- Orders Shipped Same Day
- No Credit Card Surcharges
- PO's Accepted
- Open Saturdays
- Great Customer Service
- International Sales Office

TERMS:

1. VISA, MC, AMEX, Discover, C.O.D., Pre-paid, and Approved PO's only.
2. FAX orders, and International orders accepted
3. All returns require an RMA number, sorry no software returns.
4. All credit card purchases are verified for your protection.

H.Co. Computer Products, Inc.
16812 Hale Avenue
Irvine, CA 92714

(German Office)
Deisterstrasse 11
Hannover, Germany
TEL: 0511-458-2411 FAX: 0511-458-2440

H.Co will beat or match prices from Wang authorized companies with new merchandise actually in stock. Offer excludes Standard SIMMS. All prices are listed at the time of purchase. Due to volatility of DRAM pricing, and LTC tariffs placed on some manufacturers, memory pricing may be higher than advertised. H.Co. same day shipping guarantee applies only to products in stock. 15% Restock fee on all non-defective returns. NO products may be returned after 30 days. Trademarks are the property of their respective companies. Prices are subject to change without notice.

CIRCLE 391 ON READER SERVICE CARD

COMPUTER RESELLERS CIRCLE 138 ON READER SERVICE CARD

SEE US AT SPRING COMDEX BOOTH #1500 EAST HALL

```
N invisibl.ico
RCX
146
F 100 1 C6 0
E 102 01 00 01 00 20 20 02
E 10E 30 01
E 112 16
E 116 28
E 11A 20
E 11E 40
E 122 01 00 01
E 12A 80
E 136 02
E 13A 02
F 142 L 3 FF
F 1C6 L 80 FF
W
Q
```

***Figure 1:* When this script is redirected into DEBUG, it creates a Windows icon that's totally transparent.**

background of the icon is defined as transparent. An invisible icon is simply one with every single pixel defined as transparent. Figure 1 is a DEBUG script, INVISIBL.SCR, that will create such an icon for you. To create INVISIBL.ICO, just enter the command `DEBUG < INVISIBL.SCR`.

For an ordinary program, all you'd have to do is edit the Program Properties in Program Manager to use the invisible icon. Since you want to change the icon for ProgMan itself, a little more work is involved. What you must do is create an item for PROGMAN.EXE in the Start-Up group. Assign it the invisible icon, and delete its description. At the same time, you may want to assign it a hotkey, in case you can't find it on the screen. Move it to the top left corner of the Start-Up group, and restart Windows. You may also want to check Minimize on Use in ProgMan's Options menu, so the item will automatically iconize itself when you run a program.

Of course, you don't have to use this technique to make ProgMan's icon invisible. You can assign any custom icon to it, define a hotkey, and change its title to whatever you want.—*Neil J. Rubenking*

WORD PROCESSING

Bookmark Bug in WinWord 6.0

TIP Soon after upgrading to Microsoft Word for Windows 6.0, I found a problem file that caused the program to crash spo-radically. Most of the time, WinWord behaved normally with the file loaded. But sometimes several lines of text would disappear from the screen when I pressed the Backspace key. Giving an Undo command at that point would retrieve the text, but any further attempt at editing quickly produced a General Protection Fault (GPF) message.

The problem was particularly annoying because, in addition to losing any unsaved text, I couldn't reload WinWord without getting completely out of Windows first. The program had tied up too much of the system resources, and there was no way to release these resources after crashing.

Since the file had never given me problems with WinWord 2.0, my first thought was that it had been corrupted. None of the usual fixes for corrupt files worked, however, and a call to Microsoft finally yielded the answer: WinWord 6.0 (but not WinWord 2.0) balks if you have a bookmark entered at the very beginning of a document. The cure is to remove the bookmark or to redefine it so that one or two characters precede it. In short: If you use bookmarks, avoid adding one at the very beginning of your documents.

Julie McCollum
Rosemont, Pennsylvania

►**PC MAGAZINE:** This is indeed an acknowledged bug in WinWord 6.0, and it's particularly disconcerting when it shows up in a file or template you've long been using in WinWord 2.0. Be aware, however, that if you run into this problem, you can usually save your work before WinWord GPFs. If you see a block of text disappear in response to typing a Backspace, give the Undo command as Ms. McCollum describes, and then *immediately* issue the File | Save command. Judging from my experience with this bug, you can expect to see the GPF message with your next keystroke, and you'll still have to back all the way out of Windows, but at least you'll have saved your work.

If you're not sure whether you have a bookmark at the beginning of a file, it's easy enough to find out. Choose Edit Bookmark to open the Bookmark dialog box, which includes a list of all bookmarks in the file. You can go to each bookmark in turn by selecting its name and hitting the Go To button. In each case, WinWord will take you to the bookmark position in your text, as indicated by the cursor (for a bookmark that marks a specific position) or by a highlighted selection (for a bookmark that extends over more than one character).

If any of the bookmarks is the very first character of the file, you'll want to remove or redefine it. To delete a bookmark, simply highlight its name in the Bookmark dialog box and choose delete. To reposition a bookmark, place your cursor or selection at the new position, choose Edit Bookmark, enter the bookmark name in the Bookmark Name text box (either by typing it in or selecting it from the list), and choose Add.

Note too that if you must have a bookmark at the very beginning of a document—for a macro to work properly, for example—you can take advantage of WinWord's predefined \StartOfDoc bookmark. (For information on predefined bookmarks, choose Help Contents, select Programming with Microsoft Word, choose the Search button, and search for Predefined Bookmarks).

It seems appropriate to broaden this discussion a bit to cover strategies for dealing with other kinds of flaky behavior. When WinWord acts strangely with a particular file, it's generally because the file is corrupted—typically because you lost a network connection while working on a file or because you were working with a file on a floppy disk and you accidentally took out the disk without closing the file.

There are several simple approaches to fixing corrupt files. First, if you can open the file and move through it, set WinWord to show paragraph marks. You do this by clicking on the Show/Hide button or by choosing Tools | Options and then the View tab and making sure there's an X in the Paragraph Marks check box. Then open a new document file and copy everything but the last paragraph mark from the corrupt file into the new file. If the corrupt information is stored with the last paragraph mark, as it often is, this will solve the problem.

If the new file still gives WinWord fits, try saving it in Rich Text Format by choosing File | Save As, entering a new name, and choosing Rich Text Format in

Get answers *every day* a spreadsheet can't give you *any day*

Real Stats. Real Easy.

Now on NT too!

Use SPSS 6.1 for Windows when you need in-depth answers quickly and easily. Go beyond summary statistics and spreadsheet row-and-column math by using the right tool for the job. SPSS is a complete tool kit of statistics, graphs and reports that enables you to answer tough questions like:

- Why did sales drop in the last quarter?
- How satisfied are my customers?
- What are the patterns in my data?

SPSS products are used today for:

Survey research of all types

- Explore consumer awareness
- Compare perceptions of products
- Discover preferences by group

Marketing and sales analysis

- Analyze your customer database
- Forecast sales by product and region
- Improve mailing responses
- Learn which promotions work best

Quality improvement

- Assess process capability
- Reduce nonconformance
- Spot unnatural patterns of variation
- Track incidence of infection

Research of all types

- Test hypotheses
- Determine group differences
- Track performance over time
- Prepare professional reports

Answer your tough questions

You don't need a Ph.D. to learn or use SPSS 6.1 for Windows. A tutorial, task-oriented help and a glossary of statistical terms will help make you an expert. You'll be surprised at how easy it is to do in-depth data analysis.

And, if you are already an expert, you'll appreciate SPSS' rich set of statistical functionality. Whatever your experience level, you'll be able to explore your data thoroughly.

Discover hidden patterns and trends in your data with over 50 high-resolution business, analytical and SQC charts. SPSS saves you time by automatically aggregating your data and labeling your charts. Then, quickly add smoothing lines, confidence intervals and more to tell the full story in your data.

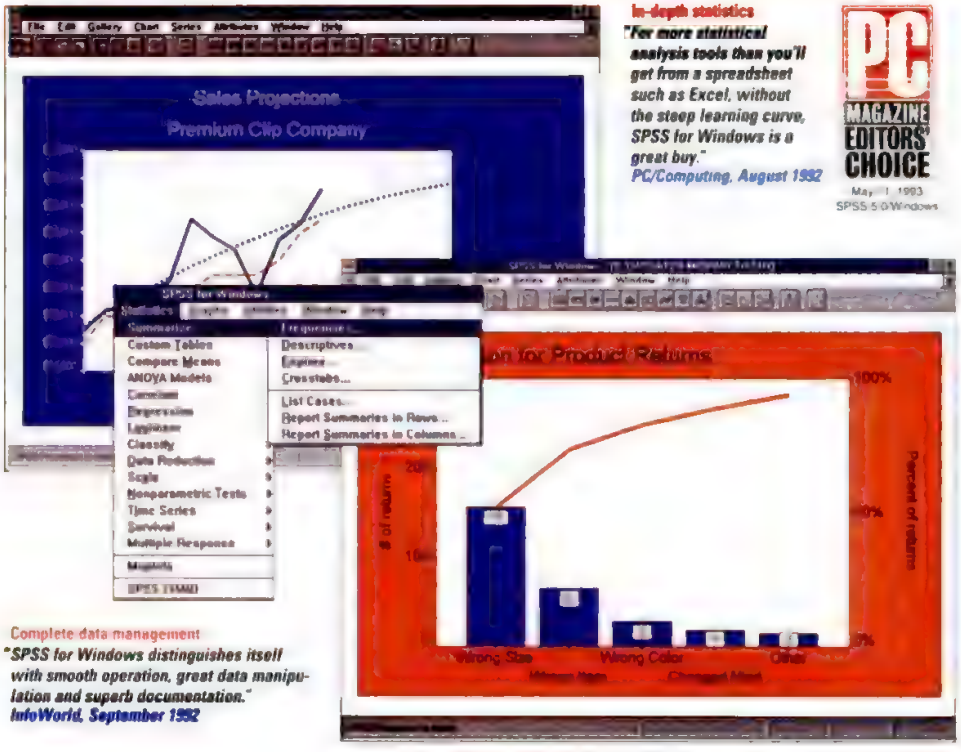
Call today to find out how to answer your tough questions every day with SPSS 6.1 for Windows!

Get a great value – order now!

Call (800) 543-5833

or Fax (800) 841-0064

CIRCLE 043 ON READER SERVICE CARD



In-depth statistics

"For more statistical analysis tools than you'll get from a spreadsheet such as Excel, without the steep learning curve, SPSS for Windows is a great buy."
PC/Computing, August 1992

PC MAGAZINE EDITORS' CHOICE
May 11 1993
SPSS 5.0 Windows

Complete data management

"SPSS for Windows distinguishes itself with smooth operation, great data manipulation and superb documentation."
InfoWorld, September 1992

Automatic statistical graphs

"A complete set of graphics and charting capabilities." *PC Week, May 1992*

Learn fast, work fast

"SPSS for Windows is an excellent full-featured set of statistical procedures...The Windows interface makes it easy and fast to use and I highly recommend it." *Marketing Research, Summer 1993*

Reasons SPSS 6.1 for Windows goes beyond your spreadsheet:

- 50+ statistical procedures
- 50+ business, analytical and SQC charts with automatic labels
- New toolbar which gives you one-button access to statistics and commonly used functions
- Technical support for statistical help
- New online tutorial
- Statistical help system
- Glossary of statistical terms
- Fast 32-bit processing
- Hot buttons between graphs and tables
- Work with even your largest data sets
- Complete report writer

- View your data as words, while doing analysis with numbers
- Keep your formulas safe and separate from your data
- ODBC / OLE
- Statistics located in easy-to-understand menus and dialog boxes
- Easy, complete data editing and management in a spreadsheet-like format
- Documentation which clearly explains statistics
- Create charts with your analysis automatically
- Automatic labeling of results

Available add-on modules:

- Explore your data more thoroughly with techniques such as factor, cluster, discriminant analysis and much more with SPSS Professional Statistics™
- Execute advanced multivariate techniques such as Cox regression, Kaplan-Meier estimation, logistic regression and more using SPSS Advanced Statistics™
- Create camera-ready tabular reports with SPSS Tables™

- Predict the future using advanced time-series analysis in SPSS Trends™
- Perform perceptual mapping, conjoint analysis and optimal scaling procedures with SPSS Categories™
- Find predictors and build better models using SPSS CHAID™
- Analyze linear structural equations and simultaneous equation models using SPSS LISREL 7™

- Improve your operations with statistical process control using QI Analyst™
- Build thematic maps with MapInfo™
- Plug components for stats, graphs and reports, complete with data management and output formatting, into your applications quickly and easily using OLE 2.0 Automation in the new SPSS Developer's Kit™. Provide both push-button statistical reports and interactive data analysis with access to all SPSS features

Microsoft Windows Compatible

yes It runs with NetWare

Get a great value – order now!

Call (800) 543-5833

or Fax (800) 841-0064

or mail to: SPSS Inc.
444 North Michigan Avenue
Chicago, IL 60611

American Express, Discover, MasterCard and VISA accepted

Name _____
Title _____
Organization _____
Address _____
City _____ State _____
ZIP _____ email _____
Phone Number ( ) _____
FAX Number ( ) _____

Try SPSS 6.1 for Windows with our unconditional 60-day money-back guarantee

SPSS
Real Stats. Real Easy.

Chicago · Washington, DC · Boulogne · Chertsey · Gonnchem · Madrid · Munich · New Delhi · Singapore · Stockholm · Sydney · Tokyo · And Distributors Worldwide

EXTREME MACHINE

100 MHZ PERFORMANCE SERIES

1
- Am486™DX4-100 processor
- 256K write-back cache RAM
- PCI Local-BUS Graphics with 1MB
- Enhanced IDE Interface
- 3.5" Floppy Drive
- Microsoft Mouse
- 101-Key Enhanced Keyboard
- Microsoft DOS 6.22
- Microsoft Windows for Workgroups
- Transporter Menu System
- 3 Year Parts & Labor On-Site

A
- 8MB RAM, 540MB IDE hard drive
- 15" SVGA .28 Digital Color Monitor

$1,549 #014001

B
- 8MB RAM, 850MB IDE hard drive
- 15" SVGA .28 Digital Color Monitor
- Double Speed CD-ROM Drive
- 16-bit Sound Card with Premium Speakers
- Microsoft Works Multimedia CD

$1,799 #014002

C
- 16MB RAM, 850MB hard drive
- 17" .28 Digital Color Monitor
- Double Speed CD-ROM Drive
- 16-bit Sound Card with Premium Speakers
- Microsoft Works Multimedia CD

$2,369 #014003

2
- Am486™DX4-100 processor
- 256K write-back cache RAM
- PCI Local-BUS Graphics with 1MB
- Enhanced IDE Interface
- 3.5" Floppy Drive
- Microsoft Mouse
- 101-Key Enhanced Keyboard
- Microsoft DOS 6.22
- Microsoft Windows for Workgroups
- Transporter Menu System
- 3 Year Parts & Labor On-Site

A
- 8MB RAM, 540MB IDE hard drive
- 15" SVGA .28 Digital Color Monitor
- Lotus 123 or AMI PRO for Windows
- 14.4 Fax/Modem with Software

$1649 #015001

B
- 8MB RAM, 850MB IDE hard drive
- 15" SVGA .28 Digital Color Monitor
- Double Speed CD-ROM Drive
- 16-bit Sound Card with Premium Speakers
- Microsoft Works Multimedia CD
- 14.4 Fax/Modem with Software
- Lotus 123 & AMI PRO for Windows

$1,949 #015002

C
- 16MB RAM, 850MB hard drive
- 17" .28 Digital Color Monitor
- QUAD Speed CD-ROM Drive
- 16-bit Sound Card with Premium Speakers
- 14.4 Fax/Modem with Software
- Lotus 123, AMI PRO & Approach for Windows

$2,599 #015003

PERCOMP

Microsystems Inc.

The Home Solution

PERSONAL SERIES

- 256K write-back cache RAM
- Local-BUS Graphics with 1MB
- Enhanced IDE Interface
- 3.5" Floppy Drive
- Microsoft Mouse
- Desktop or Mini Tower Case
- 101-Key Enhanced Keyboard
- Microsoft DOS 6.22
- Microsoft Windows for Workgroups
- Transporter Menu System
- 3 Year Parts & Labor On-Site

- 4MB RAM
- 540MB 10ms IDE hard drive
- 14" SVGA .28 Non-Interlaced Monitor

Am486™DX2-66	Am486™DX2-80	Am486™DX4-100
$1,229	$1,249	$1,279
#011001	#011002	#011003

- 8MB RAM
- 540MB 10ms IDE hard drive
- 15" SVGA .28 Digital Color Monitor
- 14.4 Fax/Modem

Am486™DX2-66	Am486™DX2-80	Am486™DX4-100
$1,469	$1,489	$1,549
#011004	#011005	#011006

PERSONAL MEDIA SERIES

- 256K write-back cache RAM
- Double Speed CD-ROM Drive
- 16-bit sound card, Microphone
- Premium speaker system
- Local-BUS Graphics with 1MB
- Enhanced IDE Interface
- 3.5" Floppy Drive
- Microsoft DOS 6.22 & MS-Mouse
- Microsoft Windows for Workgroups
- 101-Key Enhanced Keyboard
- **Microsoft Home-Family Bundle Pack Encarta '95, Works Multimedia CD, Dangerous Creatures, Money, Arcade & Best of Windows Entertainment Pack**
- Transporter Menu System
- 3 Year Parts & Labor On-Site

- 4MB RAM
- 540MB 10ms IDE hard drive
- 14" SVGA .28 Non-Interlaced Monitor

Am486™DX4-100
$1,499
#012003

- 8MB RAM
- 540MB 10ms IDE hard drive
- 15" SVGA .28 Digital Color Monitor
- 14.4 Internal Fax/Modem

Am486™DX2-66	Am486™DX2-80	Am486™DX4-100
$1,729	$1,749	$1,799
#012004	#012005	#012006

ADVANCED SERIES

- 256K write-back cache RAM
- Double Speed CD-ROM Drive
- 16-bit sound card, Microphone
- Premium speaker system
- Enhanced IDE Interface
- 3.5" Floppy Drive
- Microsoft DOS 6.22 & MS-Mouse
- Microsoft Windows for Workgroups
- 101-Key Enhanced Keyboard
- Transporter Menu System
- 3 Year Parts & Labor On-Site

- 8MB RAM
- 540MB 10ms IDE hard drive
- Diamond STEALTH 64 PCI (1MB)
- 15" SVGA .28 Digital Color Monitor
- Choice of (1) Lotus Application: Lotus 123, AMI Pro, Freelance, Approach Database or Organizer

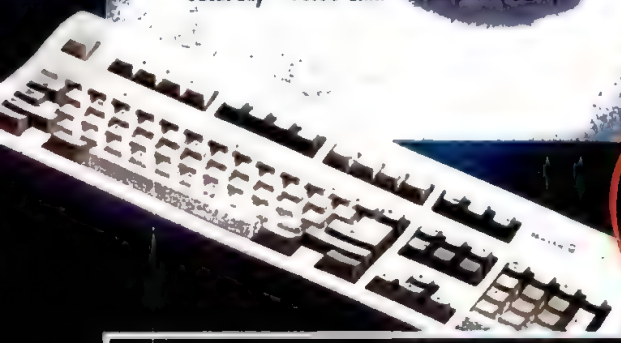
Am486™DX2-66	Am486™DX2-80	Am486™DX4-100
$1,729	$1,749	$1,799
#013001	#013002	#013003

- 8MB RAM
- 850MB 10ms IDE hard drive
- Diamond STEALTH 64 PCI (2MB)
- 15" SVGA .28 Digital Color Monitor
- 14.4 Internal Fax/Modem
- Choice of (2) Lotus Applications: Lotus 123, AMI Pro, Freelance, Approach Database or Organizer

Am486™DX2-66	Am486™DX2-80	Am486™DX4-100
$1,979	$1,999	$2,049
#013004	#013005	#013006

Monday - Friday 8:00 a.m. - 7:00 p.m.
Saturday - 10:00 a.m. - 4:00 p.m. (CDT)

No service charge for credit card orders. We are not responsible for errors in typography. Original shipping and handling fees, as well as return shipping charges, are non-refundable. There are no returns for credit after 30 days. Please call PerComp™ for an RMA number prior to returning any merchandise. Call or write for more information on warranties and deliveries. Call for latest pricing information.
MASTERCARD, VISA, DISCOVER & AMERICAN EXPRESS ACCEPTED
All registered and unregistered trademarks are the sole property of their respective companies.



- Three Year "TRUE WARRANTY" On All Systems
- Full 3 Years On Parts And Labor Provided On-Site Nationwide
- 30 -Day Satisfaction Guarantee
- 24-Hours-a-day, 7 Days A Week, Technical Hotline
- On-Line Bulletin Board Service
- Lifetime, Toll-Free Technical Support

Fax: 214-234-8658 **1-800-856-6688** BBS: 214-234-8376

CIRCLE 024 ON READER SERVICE CARD

For Value, It's Arlington!

Thousands of printers in stock!

EPSON

LX300	$169
FX870/1170	$275/$359
LQ300/LQ570+	$189/$239
LQ870/LQ1070+	$429/$355
LQ1170/LQ2550	$599/$919
DFX5000+	$1329
DFX8000	$2239
Action Laser 1100	$379
Action Laser 1400	$565
Action Laser 1600	$739
Stylus 800+/1000	$205/$425

ACTION LASER 1500–$449.00
- PC Computing–"Best PCL 5"
- 27 fonts • 6 PPM
- PCL 5 compatible

WITH 2MB $499

ACTION NOTE 660C-DX2/66 dual scan color, 340MB $1849
ACTION 660CX-DX2/66 active $2949
ACTIONNOTE 866C-DX2/66... $2299

Highest print resolution available in an ink jet printer.

720 dpi print resolution
- Produces the finest color images which are difficult to distinguish from a photographic image.
- EPSON's special 720 dpi coated paper eliminates ink from spreading when it hits the page.

360 dpi print resolution
- Produces excellent photographic images and the finest color images (non-photographic images, such as standard business graphics).
- Produces the finest monochrome text printing.
- Plain paper or bond paper can be used when printing at this resolution.

EPSON
Stylus COLOR

The most advanced color ink jet printer not only in its price class, but in the industry!

$489.00

720 DPI color

MODEMS

Hayes

Accura 14.4/Fax-Int/Ext	$89/$99
Accura 28.8 Int/Ext	$169/$199
Optima 96/14.4	$299/$349
Optima Pocket 14.4	$279
Optima 28.8 Int/Ext	$329/$389
PCMCIA 14.4/28.8	$159/$319

Boca Modem

14.4 Int./Ext.	$89/$99
28.8 Int/Ext V.34	$179/$199
PCMCIA 14.4	$189
Pocket 14.4/28.8	$249/$359

U.S. Robotics

Sport 14.4 Fax Int/Ext	$95/$109
Sport 28.8 V.34 Int/Ext	$209/$225
Courier V.34 Int/Ext	$379/$419
Worldport PCMCIA 14.4	$179
Worldport Pocket 14.4	$195

MaxTech

14.4 w/FAX Int/Ext	$69/$95
28.8 Int/Ext V.34	$159/$189
PCMCIA 14.4	$129

MultiTech

Complete line in stock

28.8 Int/Ext V.34	$169/$189

Arlington Computer Products, inc.

HEWLETT PACKARD

Laserjet IV/IV+	$1199/$1399
Laserjet IVP / IVMP	$949/$1299
Laserjet IVL w/toner	$539
Laserjet IV V/MV	$1989/$2889
Laserjet IVM+	$1949
Laserjet IV SI w/toner	$2979
Laserjet IV SI MX	$4229
HP IIID	$1599
Paintjet XL300	$2199
OfficeJet	$779
Jet Direct 2550/2552	$319/$349
1MB/2MB upgrade	$69/$99
4MB/8MB upgrade	$159/$319
DeskJet 256K	$69
DeskJet 320/550C	$299/$399
DeskJet 540/560C	$285/$479
DeskJet 1200C	$999
DeskJet 1200C/PS	$1639
3P/IICX Scanner	$469/$789*

CHIPS

Special Orders–*please call!*

1MB/4MB Simms	$45/$139
8MB/16MB Simms	$319/$539
Cyrix SRx2-20/40 & 25/50	$179
Cyrix DRx2-20/40 & 25/50	$179
Cyrix DRx2-33/66	$209
HP 4MB upgrade	$159
OKI Laser 2 MB	$125

OVER DRIVE

SX2-Double 20-25 MHZ	$115
DX2-50 Double 20-25 MHZ	$119
DX2-66 Double 33 MHZ	$169
DX4-75 MHZ/100 MHZ	$209/$275
Pentium-63MHZ	$349

NETWORKING

NetWare 3.12 5-user	$569
NetWare 3.12 10-user	$1279
NetWare 3.12 25-user	$1839
NetWare 3.12 50-user	$2299
NetWare 3.12 100-user	$3199
NetWare 3.12 250-user	$4399
Net 4.1 5/10-user	$649/$1449
Net 4.1 25/100-user	$1979/$4049
Lantastic Starter 6.0	$219
Lantas 6.0 5/10-user	$319/$569
Node Runner SI 2000	$75
NE2000/5-pack	$69/$289
SMC Hub 8-port T/P	$279
SMC TP 12 node Conc	$509
SMC+16 6-pack	$525
SMC Ethercard + Elite	$105
SMC 16 6/24-pack	$449/$1559
3 Com EtherLink III	$99
3 Com EtherLink III 5-pack	$399
3 Com EtherLink III 20-pack	$1439
Intel Ether 16/5-pack	$89/$429
Intel Ether 16 20-pack	$1579
Intel Pro TP 5/20-pack	$379/$1299
Intel Flash 5/20-pack	$449/$1449
Intel Eth. Cmbo/5-pack	$115/$509
Intel 10/100 mbps PCI	$189
Intel Netport EL / XL	$359/$409
Intel Token Express Pro	$229
Xircom Pocket Ethernet	$249
Xircom PCMCIA Ethernet	$199

SCANNERS/DIGITIZERS

Canon 4015 Scanner	$699
Epson Scanning 600	$479
Epson Scanning 800C	$729
Epson Scanning 1200 Prof.	$1199
Logitech Color ScanMan	$249
Microtek ScanMaker IISP	$519
Microtek ScanMaker IIHR	$799
Avec 2400 PC Designer	$459
Relisys 2412/4816	$729/$899
Relysis 4830	$1549
Relisys 9612/9624	$1379/$1789
ScanMan w/OmniPage	$139
Summasketch 12 x 12	$269
Summasketch 12 x 18	$499
UMAX Vista S6/S8	$599/$749
UMAX T630/630 PRO	$539/$639
UMAX 1260/PRO	$799/$899
UMAX Power Look	Call
UMAX PageOffice	$389

SOFTWARE

Aldus PageMaker 5.0	$495
Clipper 5.2	$509
Corel Draw 5.0-CD	$409
Corel Draw 5.0 upgrade	$169
D Base IV	$379
Harvard Graphics 3.0-WIN	$259
Lotus 123 2.4/3.4	$279/$325
Lotus 123 5.0	$279
Lotus Smart Suite	$379
Lotus Notes Client	$409
Microsoft Office	$439
Microsoft Office Pro	$509
Microsoft Word	$289
Microsoft Windows 3.1	$79
Microsoft DOS 6.2 upgrade	$59
Word Perfect 6.0A DOS	$249
Word Perfect Windows	$239
Word Perfect 6.0 upgrade	$85

OKIDATA

400e	$395	ML380	$205
410e PS	$735	ML520	$365
410e	$519	ML521	$489
OL810	$899	ML590	$409
OL830	$1079	ML591	$559
ML320	$295	ML395	$949
ML321	$415	ML3410	$1199

Doclt 3000/4000 ..... $1049/$1389

Panasonic Office Automation

2023	$159*	3696	$429
2135	$189*	4400	$349
2624	$389	4430	$639
3624	$369	4440	$979
3626	$399	5400	$479
3124	$309	SP100	$759

4410/4430 2 MG $129

SHARP

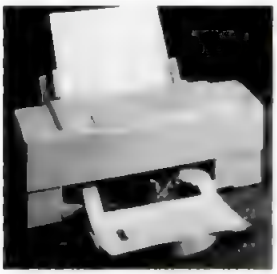
JX-9400/H	$389/$529
JX-9460/9660PS	$649/$1219

*after rebate

FOR ORDERS & QUOTES
800-548-5105

Canon

BJC-600E – $459.00
Great color all around. Whether you're printing text or graphics, the BJC-600E will give you sharp and vivid color output.



BJ-30/100 .....$259/$199
BJC-70/800 .....$345/$799
BJC-4000 .....$345
BJ-200ex $229
BJ-230-Wide Carriage $389
LBP-430W/1260 .....$435/$1249

CANON NOTEJETS

Built-in Printer!

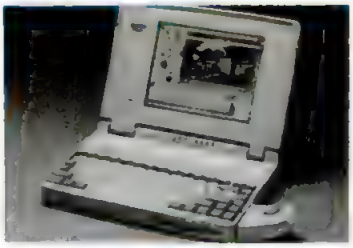
Notejet 486 340MB.....$1349
Notejet 340MB - Color...$1979
Notejet DX4/75–500MB .$3499
Notejet DX4/100-8MB-810MB, dual scan $3649

Innova Book 150C DX266-340MB.....$2149
Innova Book 150CT DX266-340MB-active.....$3339
Innova Book 200LS DX4/100, 8MB, 520MB....$2899
Desktop Pentium: 8MB, 540MB, monitor.....$1849

NEC

Versa V 4/50 250 Dual color .$2299
Versa V 4/50 250 Act color....$2825
Versa V 4/50 340 Act color....$2949
Versa V/50C 540MB $3349
Versa V/75C 540MB $3699

Versa M 4/75 250 Dual color $2999
Versa M 4/75 340 Act color...$3699
Versa M/75C 540MB.....$3979
Versa M/75HC 540MB.....$4379
Versa M 4/100 340 Act color .$3999
Versa M 4/100 810 Active $4949
Versa P/75C 540MB.....$4599
Versa P/75C 810MB $4949
Versa P/75C HR 810MB.....$5349



TOSHIBA

T1910/CS .....$1289/$1739
T2100/CS .....$1399/$2179
T2100CT $3049
T2150CDS/CDT .....$3549/$4639
T2400CS/CT.....$2389/$2869
T2450CT/T3600CT.....$3949/$3439
T4800CT/T4850CT .....$4125/$4469
T4900C/T6600C .....$5449/$5449

AST

Ascentia 4/DX250 340 pass ...$2269
Ascentia 4/DX250 340 act.....$3679
Ascentia DX4/75 340 pass.....$2999
Ascentia DX4/75 510 act.....$4699

SHARP

PC-8700/8900.....$2399/$3699
PC-8660 DX2-50 Active.....$2299

MONITORS

MAG INNOVISION

LX1450LG $229
DX15F/MX15F .....$329/$429
DX17F $599
MXP17F / MX21F.....$849/$1619

NEC

2V/3V/XV14.....$329/$399/$299
XV15/XV17.....$425/$729
XE15/17 MultiSync .....$519/$959
XP15/17 MultiSync .....$639/$1189
XE21/XP21 .....$1929/$2359

VIEWSONIC

15G/15.....$379/$389
17G/17-2.....$709/$829
20G/20/21.....$1329/$1419/$1649

PRINCETON

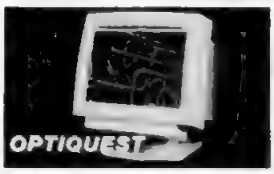
Ultra 14/14ni.....189/219
Ultra 15 1280x1024 15".....$319
Ultra 17 1280x1024 17".....$559

NOKIA

449E.....$419 447L.....$679
447X .....$979 445X.....$2149

NANAO

F550IW/F560IW.....$969/$1199
F760IW.....$1949
T2-17/20 ESP .....$1249/$1895



1000/1500/1562A.$239/$365/$329
2000DS/2000DC .....$349/$369
4000DC/4000TC .....$645/$789
4500DC/2082DC .....$739/$1289

DRIVES & TAPES

Back Pack 340 / CD .....$419/$299
Seagate 452MB 3491A $169
Seagate 535MB 3660.....$199
Seagate 1.0GB SCSI-2 .....$539
Seagate 1.0GB IDE.....$399
West Digit 420/540 .....$159/$199
West Digit 730/1GB.....$279/$399
1.44 / Dual Floppy .....$39/$89

COLORADO MEMORY SYSTEMS INC.

Trakker 250/350 .....$259/$299
Jumbo 250/350 .....$129/$159
Jumbo 700/Trakker 700 .$259/$379
PowerTape 1.1GB internal.....$619
Power 2.0GB int/ext ...$929/$1069
250 Meg tapes formatted $17

APC

280/400/450 .....$99/$149/$179
600/900/1250 .....$239/$339/$439
Smart 400/600.....$279/$329
Smart 900/1250 .....$469/$589

CD ROM

Diamond Multi 4000 4X.....$319
Diamond Multi 5000 4X.....$419
Teac SuperQuad 4X.....$289
Toshiba Quad 3501 .....$295
Sound Blaster 16 SCSI-2 .....$165
Plextor Quad Int/Ext.....$369/$449

NEC

MultiSpin 2V Deluxe: sound card, speakers, five CD titles $275
NEC DS 2VI & Encarta $165
NEC 3Xp+/4X Pro.....$379/$669
NEC 4Xi $365
NEC 4Xi, SCSI, Encarta $449
NEC 4Xe Quad or Kit ..$459/$539

VIDEO BOARDS

ATI Graph Prof 2MB.....$249
ATI Turbo 2MB/4MB.....$299/$499
Diamond Stealth 2MB $309
Diamond Stealth 64 4MB $439

ARLINGTON COMPUTER PRODUCTS...GREAT SERVICE SINCE 1984!

- **PC Magazine** *"...Arlington offers worry-free mail order purchasing!"*
- **PC Computing – 1994** *"A 10-year track record of consistent service!"*
- **PC Computing** *"...Courteous service and terrific technical support!"*
- **PC World (3/95)** *"...Consistently the lowest prices!"*

ILLINOIS - CORPORATE SALES
708-541-6694

CUSTOMER SERVICE AND IN ILLINOIS
708-541-6333

Prices and availability subject to change without notice. Qualified purchase orders accepted.

SHIPPING
708-541-6595

TECHNICAL ASSISTANCE
708-541-6583

HOURS (CENTRAL TIME)
7:30am - 8:30pm / Monday thru Friday
9:00am - 5:00pm / Saturday

FAX
708-541-6881

851 Commerce Court, Buffalo Grove, IL 60089

DISCOVER VISA MasterCard

No surcharge for charge cards!

FOR ORDERS & QUOTES

800-548-5105

CIRCLE 338 ON READER SERVICE CARD

the Save File As Type box. Once you've saved the file in RTF, you can open and resave it in WinWord format.

If neither of these strategies helps, try bracketing the problem by copying sections of the file to a new file. Copy the first half to one file and the last half to another, see which half the problem goes with, and repeat the bracketing with smaller and smaller sections. Once you've found the page containing the problem, you may be able to isolate it to a single paragraph or so by further bracketing.

Of course, if you can't open the document, none of these fixes will be much help. With WinWord 6.0, if the program hangs when you try to open the file, try switching to draft font first. Choose Tools | Options and then the View tab, and make sure there's an X in the Draft Font check box. If you can then open the document, you can try the first three fixes.

Finally, if none of these suggestions works, you should still be able to open the file with most text editors, including Windows Write. Strip out all the header information, which means everything that shows up before the text of the file, as well as everything that shows up after the text. Then save the file in any format WinWord can read. At this point, you'll usually be able to open the file in WinWord without problems. Leave this as a last line of defense, however. It will normally let you recover all your text, but you'll lose all your formatting. Note that if you have the Allow Fast Saves option set on the Tools | Option | Save tab, you may find the text jumbled once you remove the header information. It's a good idea *not to use the Fast Saves option* in any case, because there are known bugs in it that can crash your system.—*M. David Stone*

SPREADSHEETS

Function-Nesting Wizardry

❓I am trying to set up an Excel 5.0 formula that returns different values depending on the value stored in an adjacent cell. My data is set up as in Figure 2.

If cell B2 is less than or equal to 40, I want cell C2 to return 10. If B1 is greater than 40 but less than or equal to 60, C2 should be 15. If B2 is greater than 60 but less than or equal to 125, C2 should equal 18. The rest of column C should be just like C2, with each cell's value dependent upon the value in the corresponding cell of column B.

I know I should be able to do all of this with the IF function, but I can't figure out how. Please explain.

Dennis Matis
Lethbridge, Alberta, Canada

►**PC MAGAZINE:** The IF function has the following syntax:

```
=IF(logical_test,value_if_true,
value_if_false)
```

That is, it accepts three arguments. The first argument is some sort of test—for example, is cell B2 < 40? The second argument is the value the function returns if the test is true, and the third argument is the value the function returns if the test is false. So if all that your formula at C2 has to do is to return 10 when B2 is less than 40 and 15 when B2 is not less than 40, you would write:

```
=IF(B2<40,10,15)
```

Simple enough. But in your case, if B2 is not less than 40, you still need to test to see whether it's less than or equal to 60. To do that in the same formula, you use a second IF function as the third argument of the first IF function. So if the requirements for C2 were as follows:

```
B2<40 . . . C2=10
B2>40 and B2<=60 . . . C2=15
B2>60 . . . C2=18
```

then your formula at C2 would be:

```
=IF(B2<40,10,IF(B2<=60,15,18))
```

Notice that the second IF function does not have to bother checking to see whether B2 is greater than 40. If B2 isn't greater than 40, this part of the formula never gets evaluated. So all the second IF has to test for is whether B2 is less than or equal to 60.

Notice also that the formula ends with two closing parentheses. One closes the "inner" IF, the other closes the "outer" IF. Getting the right number of parentheses all in the right places can be a bit of a challenge, particularly in formulas that involve functions "nested" within one another—that is, formulas in which functions are supplied as arguments to other functions. If you trip up on the parentheses, I recommend you use Excel's Function Wizard to build your formula. More about that in a moment.

Meanwhile, we're still not quite finished with this formula, because your letter says C2 should be 18 only if B2 is greater than 60 but also less than or equal to 125. That means we need yet another IF function as the third argument to the second IF function. We'll set this one up just the same way we set up the second IF, except for one detail. Your letter doesn't say what C2 should equal if B2 is greater than 125.

	A	B	C
1	Date	River Flow	Required Minimum Flow
2	1-Mar	95	
3	2-Mar	35	
4	3-Mar	55	
5	7-Mar	140	
6	4-Mar	90	
7	5-Mar	95	
8	6-Mar	98	

Figure 2: **The Required Minimum Flow column needs to be filled in with numbers based on the River Flow column.**

We can handle that problem in two ways. The first way is simply to omit the third argument in the third IF function. The second way is to supply some value—something that makes sense under the circumstances—as the third argument to the third IF. If we go the first route, the final formula looks like this:

```
=IF(B2<40,10,IF(B2<=60,15,IF(B2<=
125,18)))
```

What does Excel do with a formula like this if all conditions in all the IFs are false, and the innermost IF does not specify a value_if_false argument? It returns the Boolean constant FALSE. That's ugly, but it's better than having the wrong answer in your cell. If you truly don't want any numeric value returned in C2 if B2 should happen to be greater than 125, you can put a text string

PERCOMP

HOME STARTER SERIES

- 4MB RAM expandable to 128MB
- 256K Write-back cache RAM
- 420MB 12ms IDE hard drive
- 2X CD-ROM drive 3.5" floppy drive
- Local Bus graphics card with 1MB
- 14" SVGA color Monitor .28dp Energy Star Compliant
- Desktop or tower case
- Microsoft Mouse & keyboard
- MS-DOS 6.22 & Windows for Workgroups
- MS Works Multimedia edition on CD
- Transporter Menu System
- True 3 Year On-Site Warranty

INTEL 486™ SX-33 VESA Local-BUS	INTEL 486™ DX2-50 VESA Local-BUS	INTEL 486™ DX2-66 VESA Local-BUS
$1,269	$1,299	$1,349
#100001	#100002	#100003

FAMILY MEDIA SERIES

- 8MB RAM expandable to 128MB
- 256K Write-back cache RAM
- 420MB 12ms IDE hard drive
- 2X CD-ROM drive 3.5" floppy drive
- 16 bit sound card and speakers
- Local Bus graphics card with 1MB
- 14" SVGA color Monitor .28dp Energy Star Compliant
- Microsoft Mouse & keyboard
- MS-DOS 6.22 & Windows for Workgroups
- **MS-Works Multimedia, Encarta, Money, Dangerous Creatures, Microsoft Arcade, Best of Windows Entertainment Pack**
- Transporter Menu System
- True 3 Year On-Site Warranty

$1,499
INTEL 486™ DX2-66

EXECUTIVE SERIES

- 8MB RAM expandable to 128MB
- 256K Write-back cache RAM
- 540MB 12ms IDE hard drive
- 2X CD-ROM drive 3.5" floppy drive
- 16 bit sound card with premium speakers
- Diamond Stealth 64-PCI 2MB
- 15" SVGA Monitor Non-interlaced .28dp Digital Control, Energy Star Compliant
- Microsoft Mouse & keyboard
- MS-DOS 6.22 & Windows for Workgroups
- Choice of Lotus 123, AMI PRO Freelance or Approach for Windows
- Transporter Menu System
- True 3 Year On-Site Warranty

INTEL 486™ DX2-66 PCI	Pentium™ Processor PCI-75MHz	Pentium™ Processor PCI-90MHz
$1,749	$2,049	$2,349
#102001	#102002	#102003

PROFESSIONAL SERIES

- 8MB RAM expandable to 128MB
- 256K Write-back cache RAM
- 850MB 12ms IDE hard drive
- 2X CD-ROM drive 3.5" floppy drive
- 16 bit sound card with premium speakers
- Diamond Stealth 64-PCI with 2MB
- 15" SVGA Monitor Non-interlaced .28dp Digital Control & Energy Star Compliant
- Microsoft Mouse & keyboard
- MS-DOS 6.22 & Windows for Workgroups
- MS Works Multimedia edition on CD
- 14.4 Fax Modem with DOS/Windows Software
- Transporter Menu System
- True 3 Year On-Site Warranty

Pentium™ Processor PCI-75MHz	Pentium™ Processor PCI-90MHz	Pentium™ Processor PCI-100MHz
$2,149	$2,499	$2,599
#103001	#103002	#103003

No service charge for credit card orders. We are not responsible for errors in typography. Original shipping and handling fees, as well as return shipping charges, are non-refundable. There are no returns for credit after 30 days. Please call PerComp™ for an RMA number prior to returning any merchandise. Call or write for more information on warranties and deliveries. Call for latest pricing information. **MASTERCARD, VISA, DISCOVER & AMERICAN EXPRESS ACCEPTED** All registered and unregistered trademarks are the sole property of their respective companies. The Intel Inside Logo, Intel and Pentium are registered trademarks of the Intel Corporation

WEATHER Any Storm . . .

with the PerComp™ advantage.

Deadlines, commitments and obligations can't be overlooked. PerComp™ meets all your requirements with our exclusive Three Year On-Site "TRUE WARRANTY" designed to help you meet all your needs, and never leave you in deep water.

PERCOMP Microsystems Inc.

The Home Solution

1-800-856-6688

Fax: 214-234-8658
BBS: 214-234-8376

Monday - Friday 8:00 a.m. - 7:00 p.m.
Saturday - 10:00 a.m. - 4:00 p.m. (CDT)

- **Three Year "TRUE WARRANTY" On All Systems**
- **Full 3 Years On Parts And Labor Provided On-Site Nationwide**
- **30 -Day Satisfaction Guarantee**
- **24-Hours-a-day, 7 Days A Week, Technical Hotline**
- **On-Line Bulletin Board Service**
- **Lifetime, Toll-Free Technical Support**

CIRCLE 053 ON READER SERVICE CARD

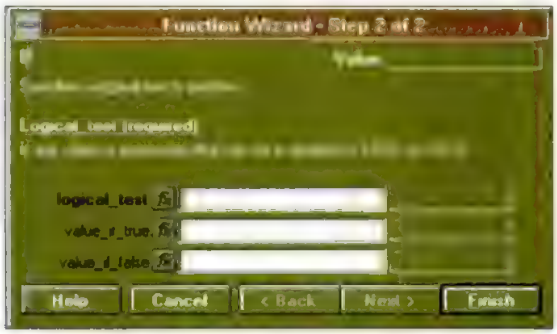


Figure 3: **Excel's Function Wizard simplifies the process of building complex formulas.**

straightforward enough, and you can point to the cells you're referencing, just as you might when creating a formula in the traditional manner. When you get to the third text box, you'll need another IF function, so click the *fx* icon to the left of this text box. The Wizard responds by displaying a categorized list of all of Excel's functions. IF is a logical function, so you would choose Logical in the list of categories, then IF in the list of logical functions. After doing that and clicking the Next button, you'll see another dialog box that looks just like the one in Figure 3 (except that it would include the word *nested* in its title bar). Fill this one out just like the first one, and so on for as many levels of nesting as required. At that point, click OK several times until you are back in the worksheet with your formula complete. (Actually, the final click would be on a Finish button not an OK button, but you get the idea. Click approving buttons until the Wizard goes away.)

in as the final argument to the innermost IF. For example, you might write something like this:

```
=IF(B2<40,10,IF(B2<=60,15,IF(B2<=
125,10,"Invalid River Flow
value.")))
```

You could even use Excel's Format Cells command to specify that C2's text be red if C2's value is text (but not if it's numeric). That would make your point about the validity of B2 a little more emphatic.

Nested IF functions are extremely useful, but constructing them can get a little messy. Excel provides a Wizard that may help you in circumstances like this. If you were building this formula with the Function Wizard, you would proceed as follows:

In cell C2, type =IF. Then click the *fx* icon to the right of the green check mark on the formula bar (or just press Ctrl-A). This summons the Wizard and lets it know that you're building a formula with the IF function. Figure 3 shows the Function Wizard.

Notice that the Wizard has three text boxes, one for each of IF's arguments. A few pithy lines of text above these boxes tell you what the IF function does, and additional text explains the purpose of each argument used by the function. Obviously, if you were working with a different function, you would see different text and perhaps a different number of text boxes. As you work with the Wizard, you'll also notice that it constructs your formula piece by piece on the formula bar as you fill out the argument text boxes.

Filling out the first two arguments is

The Function Wizard not only explains all of Excel's functions, it also shows intermediate values and gets the parentheses right.

The Function Wizard has several virtues. It explains what each function in Excel's library is for and what arguments are required. It shows intermediate values as you're building complex formulas. Best of all, it gets all those pesky parentheses in the right places for you.—*Craig Stinson*

■ **DATABASES**

FoxPro's "Source is Out of Date" Message

❓I have been bugged for some time by the message "Source is out of date" when using FoxPro for MS-DOS. When this message appears, my work comes to a complete halt. There is nothing in Microsoft's help screens or instruction books that explains it, though references are made to the message.

Can you tell me what "source" they are talking about? What can I do to correct the problem so that I can continue with my work? How can I avoid creating the error in the future? Is there a general rule that covers this?

John R. Crane
Sedona, Arizona

▶**PC MAGAZINE:** The *source* they refer to is the original program source code written by whoever created your application. Here's how it works: To create a FoxPro program, you type commands into a source file (a text file) and then "compile" the source file. This converts the commands into a special concise format that FoxPro understands and can execute quickly. The output of the compilation process is the file that FoxPro executes when you run your application. This compiled output file and the program source file have to be kept in sync. When the source file is modified, it must be recompiled to generate a new compiled output file.

When this step is not taken, you get the "Source is out of date" message. The message means you have a source file that is not in sync with its compiled output file. You will also get the message if you somehow change the date/time stamp of your source file, even if you haven't modified the program (for example, by using a utility program like TOUCH or the Norton Utilities to alter the file's date/time stamp).

To eliminate the message, you have to re-create the compiled file by opening the source file and then choosing Generate from the Program menu. Or, if your application uses a project, open the project and select the Build option. Then choose Rebuild All and click the OK button.

You may also get the "Source out of date" message if you have older versions of the program source code in your PATH ahead of the directory where the compiled file resides. In that case you should inventory your system and remove unwanted extra copies of the program source code.—*Sal Ricciardi* □

COMPUTER DISCOUNT WAREHOUSE

Showcase Item

Microsoft Office

Microsoft

Whether you choose the Microsoft® Office Standard or Professional edition, you get a collection of full-featured products that look alike and work together as if they were a single program.

Office V4.2 for Windows

■ Word V6.0 ■ Excel V5.0 ■ PowerPoint V4.0 ■ Mail license

Office Professional V4.3 for Windows

■ Word V6.0 ■ Excel V5.0 ■ PowerPoint V4.0 ■ Access V2.0 ■ Mail license

PRICE DROP For a limited time!

Office V4.2			Office Professional V4.3		
Upgrade	$249.49	CDW 39330	Upgrade	$334.74	CDW 40784
3.5"	$429.91	CDW 39331	3.5"	$519.08	CDW 40956
CD-ROM	$429.91	CDW 39332	CD-ROM w/Bookshelf	$519.98	CDW 48563
License	$365.57	CDW 46787	License	$449.00	CDW 47914

For all your computing needs, call for your free catalog today!

WHY PAY RETAIL? CDW SELLS SOFTWARE FOR LESS!

Adobe Illustrator V4.0 WIN 439.71
Adobe Pagemaker Megapack V5.0 WIN 501.00
Adobe Photoshop V3.0 WIN 665.76
Aldus Type Twister V1.0 WIN 28.69
Arabesque ECCO Pro V2.0 WIN 196.64
Arabesque ECCO Simplicity V2.0 199.00
Ares Fontminder V2.5 WIN 45.18
Autodesk AutoCAD LT V1.0 WIN 544.44

WordPerfect
V6.1 for Windows
Version upgrade
$86.00 CDW 47866

Autodesk Autosketch V2.0 WIN 124.78
Autodesk Generic CADD V6.1 DOS 61.14
Avantos Manage Pro V2.1 WIN 161.14
Activision Mechwarrior II CD 49.99
Berkeley After Dark V3.0 WIN 31.61
Berkeley After Dark Star Trek WIN 34.00
Berkeley Disney Screen Svr WIN 33.78
Berkeley More After Dark WIN 34.00
Borland Dashboard V2.0 WIN 34.78
Borland Dashboard Sidekick WIN 34.78
Borland dBASE V5.0 DOS 499.00
Borland dBASE V5.0 DOS LIC 256.99
Borland dBASE V5.0 DOS vers upg 124.99
Borland dBASE V5.0 WIN 499.00
Borland dBASE V5.0 WIN CD 499.00
Borland dBASE V5.0 WIN upg 124.99
Borland Paradox V4.5 DOS 499.00
Borland Paradox V4.5 DOS upg 124.99
Borland Paradox V5.0 WIN 499.00
Borland Paradox V5.0 WIN upgrade 124.99
Borland Paradox V5.0 WIN vers upg CD 124.99
Borland ReportSmith V2.5 WIN 149.00
Borland Turbo C++ V3.0 99.00
Borland Turbo C++ WIN visual ed 99.00
Borland Turbo Pascal V1.5 WIN 99.00
Borland Turbo Pascal V7.0 DOS 99.00
Broderbund Automap V3.0 WIN 47.87
Broderbund CNIN 1993 WIN CD 19.83
Broderbund MMS* CD 19.83
Broderbund Printshop Dlx V2.0 WIN 48.46
Caere OmniPage Direct V2.0 WIN 199.00
Caere OmniPage Pro V5.0 WIN 499.00
Caere Personal PageKeeper V2.0 WIN 99.99
Calera WordScan Plus V3.0 WIN 199.00

WordPerfect
PerfectOffice Standard Edition V3.0 for Windows Version upgrade
$186.00 CDW 48125

Colorado Backup V2.0 WIN 79.99
CA Clipper V5.2 499.00
CA Clipper V5.2 vers upg 124.99
CA Realizer V2.0 WIN 199.00
Corel CD Power Pack w/headphones 99.99
Corel Flow V2.0 WIN + CD 199.00
Corel Gallery 2 CD 99.99
Corel Gallery V1.0 WIN CD 99.99
Corel Photopaint Plus V5.0 WIN 184.47
Corel Photopaint Plus V5.0 WIN CD only 99.99
CorelDRAW V3.0 499.00
CorelDRAW V3.0 CD only 99.99
CorelDRAW V3.0 to V5.0 upg CD only 364.37
CorelDRAW V3.0 to V5.0 upgrade 387.21
CorelDRAW V4.0 499.00
CorelDRAW V4.0 CD only 99.99
CorelDRAW V4.0 to V5.0 upg 311.03
CorelDRAW V4.0 to V5.0 upg CD only 189.99
CorelDRAW V5.0 544.01

CorelDRAW V5.0 CD only 429.94
Corel SCSI V2.0 81.64
CompuServe Member Kit WIN 26.24
Claris FileMaker Pro V2.1 WIN 114.49
Claris Works V3.0 WIN 63.61
Dragon QA Plus V6.0 WIN 59.44
Dariana WinSleuth Gold+ 58.60
DCA Crosstalk V2.1 WIN 49.00
Deltina Communications Suite V2.1 WIN 116.94
Delrina WinFAX PRO V4.0 49.38
DeLorme MapExpert WIN 247.75
Delorme Street Atlas V2.0 WIN CD 59.84
Farallon Timbuktu V1.0 WIN 127.14
Frame Tech Framemaker V4.0 WIN 741.00
Fractal Design Dabbler V1.0 WIN 49.20
Fractal Design Painter V3.0 WIN 301.53
Frame Tech Framemaker V4.0 WIN 555.00
Hilgrave HyperAccess WIN 34.49
Hilgrave Netroom V3.0 DOS 49.99
IBM OS/2 Warp V3.0 78.27
IBM OS/2 Warp V3.0 CD 78.27
IBM PC-DOS V6.3 UPG 49.99
id Software DOOM II 44.95
id Software DOOM II CD 48.95
Inset Systems Hijaak Suite V1.0 WIN 85.28
Intuit Quickbooks V3.0 WIN 59.99
Intuit Quicken Companion V2.0 WIN 34.80
Intuit Quicken V4.0 WIN 49.99
Intuit Quicken V6.0 DOS 49.99
Intuit QuickPay V1.0 DOS/WIN 58.76
Interplay Descent CD 39.99
LaserTools Print Cache 46.46
Landmark WINProbe V3.0 41.75
Lotus 1-2-3 V2.4 DOS 322.65

Microsoft Word
V6.0 for Windows Upgrade
$109.29 CDW 32852

Lotus 1-2-3 V2.4 DOS upg 93.99
Lotus 1-2-3 V3.4A DOS server 553.51
Lotus 1-2-3 V4.0 DOS license 414.00
Lotus 1-2-3 V4.0 DOS upg 93.99
Lotus 1-2-3 v5.0 WIN 499.00
Lotus 1-2-3 v5.0 WIN upgrade 124.99
Lotus Ami Pro V3.1 WIN 99.99
Lotus Approach V3.0 WIN 199.00
Lotus cc Mail Desktop V2.1 WIN 99.99
Lotus cc Mail Desktop V4.02 DOS 99.99
Lotus cc Mail Mobile V2.1 WIN 99.99
Lotus cc Mail Router V5.1 499.00
Lotus Freelance V2.1 WIN 199.00
Lotus Notes Client V3.2 WIN 144.00
Lotus Organizer V2.0 WIN 99.99
Lotus ScreenCam V1.1 WIN 99.99
Lotus SmartSuite V3.0 WIN 353.71
Lotus SmartSuite V3.0 WIN upg 264.99
Organizer V2.0 WIN vers upg 124.99
LucasArts Rebel Assault 49.99
LucasArts TIE Fighter 49.99
LucasArts X-Wing 29.99
Mathsoft Math-CAD V5.0 WIN 199.00
McAfee VirusScan V2.1 WIN 41.99
Microcom Carbon Copy V2.5 WIN 199.00
Microcom Carbon Copy V6.1 DOS 137.47
MECA Managing Your Money V10.0 DOS 49.99
Procomm Plus V2.01 DOS 99.99
Procomm Plus V2.1 WIN 129.99
Microhelp Uninstaller V2.0 WIN 49.99
Microsoft Access V2.0 WIN 499.00
Microsoft Access V2.0 WIN dev kit 299.00
Microsoft Access V2.0 WIN solutions pk 499.00
Microsoft Access V2.0 WIN upg 112.99
Microsoft Answer Lands V1.0 WIN CD 49.99
Microsoft Arcade V1.0 WIN 49.84
Microsoft Baseball 1994 WIN CD 39.79
Microsoft Bookshelf 1994 CD 59.15
Microsoft Cinemania 1995 CD 53.01

MS Complete Basketball V1.0 WIN CD 39.71
Microsoft Creative Writer V1.0 WIN 49.99
MS Dangerous Creatures V1.0 WIN CD 52.61
Microsoft Dinosaurs CD 51.46
MS Electronic Forms Design V1.0 WIN 549.00
Microsoft Encarta 1995 CD 61.99
Microsoft Entertainment Pack (Best) WIN 34.99
Microsoft Excel V5.0 WIN 499.00
Microsoft Excel V5.0 WIN comp upg 124.99
Microsoft Fine Artist V1.0 WIN 34.99

Symantec
Norton pc ANYWHERE V2.0 for Windows
$89.86* CDW 48136
*After $30.00 mail-in rebate, ends 5/31/95

Microsoft Flight Simulator V5.0 DOS 42.24
Microsoft FORTRAN V5.1 182.99
Microsoft FoxPro V2.6 DOS 499.00
Microsoft FoxPro V2.6 DOS dist kit upg 124.99
Microsoft FoxPro V2.6 DOS upg 124.99
Microsoft FoxPro V2.6 Pro DOS 499.00
Microsoft FoxPro V2.6 Pro DOS upg 124.99
Microsoft FoxPro V2.6 Pro WIN 499.00
Microsoft FoxPro V2.6 Pro WIN upg 124.99
Microsoft FoxPro V2.6 WIN 499.00
Microsoft FoxPro V2.6 WIN dist kit upg 124.99
Microsoft FoxPro V2.6 WIN upg 124.99
Microsoft MS-DOS V6.22 step-up 49.99
Microsoft MS DOS V6.22 upg 49.99
Microsoft MS-DOS V6.22 upg 3pk 124.99
Microsoft Multimedia Beethoven CD 19.99
Microsoft Multimedia Golf V2.0 WIN CD 19.99
Microsoft Musical Instruments CD 19.99
Microsoft Office Pro V4.3 WIN 499.00
MS Office Pro V4.3 WIN CD w/Bookshelf 549.00
Microsoft Office Pro V4.3 WIN license 299.00
Microsoft Office Pro V4.3 WIN upg 124.99
Microsoft Office V4.2 WIN 499.00
Microsoft Office V4.2 WIN CD 499.00
Microsoft Office V4.2 WIN license 365.57
Microsoft Office V4.2 WIN upg 249.49
Microsoft PowerPoint V4.0 WIN 499.00
Microsoft PowerPoint V4.0 WIN upg 199.99
Microsoft Project V4.0 WIN 499.00
Microsoft Project V4.0 WIN vers upg 124.99
Microsoft Publisher Styles V2.0 WIN 49.99
Microsoft Publisher V2.0 WIN 99.99
Microsoft Schedule+ V1.0 WIN starter kit 119.12
MS Testing Tools for Windows V3.0 CD 499.00
Microsoft TrueType Font Pack 34.99
Microsoft Visual BASIC Pro V3.0 WIN 499.00
MS Visual BASIC Pro V3.0 WIN comp upg 124.99
Microsoft Visual C++ V1.0 WIN 499.00
Microsoft Visual C++ V2.0 499.00
MS Win NT Advanced Server V3.5 CD 1,499.00
Microsoft Win NT Workstation V3.5 499.00
Microsoft Win NT Workstation V3.5 CD 499.00
MS Win NT Workstation V3.5 CD vers upg 124.99
Microsoft Win NT Workstation V3.5 vers upg 84.99
Microsoft Win/Wrkgroups V3.11 99.99
Microsoft Win/Wrkgroups V3.11 add-on 149.99
Microsoft Win/Wrkgroups V3.11 resource kit 49.99
Microsoft Windows V3.11 99.99
Microsoft Windows V3.11 license 99.99
Microsoft Word V6.0 DOS upg 124.99
Microsoft Word V6.0 DOS 499.00
Microsoft Word V6.0 DOS vers upg 124.99
Microsoft Word V6.0 WIN 499.00
Microsoft Word V6.0 WIN upg 124.99
Microsoft Works + Money V3.0 WIN 99.99
Microsoft Works V3.0 DOS 99.99
Mauramedia Freeland V4.0 WIN 49.99
Maxis SimCity 2000 DOS 39.99
Maxis Wrath of the Gods 39.99
Norton-Lambert Close Up V6.0 499.00
Norton-Lambert Close Up V6.0 remote 299.00
ManageWise V1.0 10 user CD 866.34
ManageWise V1.0 100 user CD 2553.97
ManageWise V1.0 1000 user CD 8783.75

ManageWise V1.0 25 user CD 1,099.00
ManageWise V1.0 250 user CD 4,299.00
ManageWise V1.0 5 user CD 499.00
ManageWise V1.0 50 user CD 1,199.00
ManageWise V1.0 500 user CD 4,699.00
Patton&Patton Flowcharting 4 WIN 199.00
Peachtree Accounting V3.0 WIN 499.00
Peachtree Complete Accounting V8.0 DOS 499.00
Persoft Smartterm 420 V3.0 WIN 164.99
Quarktas 386MAX V7.0 DOS 69.99
Quarterdeck DESQVIEW 386 V2.6 99.99
Quarterdeck Desqview V2.0 WIN 164.99
Quarterdeck QEMM V7.5 69.99
Quarterdeck QEMM V7.5 UPG 39.99
Quarterdeck SideBar V1.0 WIN 49.99
Quark QuarkXPress V3.3 WIN 1,199.00
SPC Harvard Graphics V3.0 WIN 299.00
SPC Harv Graph V3.0 WIN vers/comp upg 69.99
SPC Harvard Graphics V3.06 DOS 99.99
SPC Harvard Spotlight V1.0 WIN 99.99
SPC Pro Write Plus V1.0 WIN 99.99
Saber LAN Workstation V5.0 499.00
Saber LAN Workstation V5.0 node 149.99
ShapeWare visis Express for MS Office 149.99
ShapeWare visis Express for SmartSuite 149.99
ShapeWare visis V3.1 WIN 149.99
Softkey Calendar Creator Plus V2.0 WIN 59.99
Spry Internet in a Box WIN 99.99
Stacker V4.0 special upg 59.99
Stacker V4.0 WIN/DOS 99.99
Symantec ACT V2.0 WIN 199.99
Symantec ACT V2.1 DOS 299.99
Symantec Direct Access V1.0 WIN 99.99
Symantec Direct Access V5.1 DOS 69.99
Symantec First ACT V1.1 WIN 99.99
Symantec Norton Ant Virus V3.0 DOS/WIN 49.99
Symantec Norton Backup V3.0 WIN 99.99
Symantec Norton Desktop V3.0 WIN 199.99
Symantec Norton Speedview V4.0 69.99
Symantec Norton Utilities V8.0 DOS/WIN 199.99
Symantec PC Tools Pro V9.0 DOS 89.99
Symantec PC Tools V2.0 WIN 89.99
Symantec pcAnywhere V2.0 WIN 149.99
Symantec pcAnywhere V5.0 DOS 199.99
Symantec pcAnywhere V5.0 DOS remote 89.99
Symantec Q&A V4.0 DOS 249.99
Symantec Q&A V4.0 WIN 199.99
Symantec Q&A V4.0 WIN comp upg 89.99
Symantec xTree Gold V3.0 DOS 149.99
Symantec XTree Gold V4.0 WIN 199.99
Timeslips V5.1 DOS 349.99
Timeslips V5.1 WIN 349.99
Touchstone Check It Pro Set 99.99
Traveling SW Laplink V V5.0 DOS 199.99
Virgin 7th Guest CD 49.99
Quattro Pro V6.0 WIN + CD 199.99
Quattro Pro V6.0 WIN upgrade 99.99
WordPerfect Clip Art Collection 69.99

Lotus 1-2-3
V5.0 for Windows Upgrade
$95.91 CDW 44436

WordPerfect Grammatik V6.0 WIN 35.80
WordPerfect InfoCentral V1.1 WIN 89.99
WordPerfect Informs Designer/Filler V1.0 89.99
WordPerfect Perfect Office V3.0 WIN 499.00
WP Perfect Office V3.0 WIN comp upg 199.00
WP Perfect Office V3.0 WIN vers upg 249.00
WordPerfect Quattro Pro V5.0 DOS 99.99
WordPerfect v5.1+ DOS 99.99
WordPerfect V6.0c DOS 99.99
WordPerfect V6.1 WIN 199.99
WordPerfect V6.1 WIN CD 199.99
WordPerfect V6.1 WIN comp upg 99.99
WordPerfect V6.1 WIN vers upg 149.99
WordPerfect Works V1.0 DOS 99.99
Walker Reflections 1 V4.1 WIN 99.99
Walker Reflections 2 V4.1 WIN 99.99

CDW® TELEPHONE HOURS
Mon.-Fri. 7:00 am - 7:00 pm CST
Sat. 8:00 am - 5:00 pm CST

Credit Card charges are not submitted until time of shipment. Prices is subject to change without notice. Shipping charges apply. Handling and packaging charges may apply. We will not be responsible for typographical errors. Shipping charges are not refundable. All sales are subject to CDW's standard terms and conditions of sale which are available upon request. We are not responsible for misprints of errors.

CDW

PCM1245

WE SELL NAME BRAND ITEMS FOR LESS!

(800) 326-4CDW

FAX (708) 465-6800

NASDAQ

CDW® is a NASDAQ traded company
TICKER SYMBOL CDWC
D & B Rated 5A1 Duns 10-762-7952

Turn the Page For More CDW® Savings

No Surcharge For Credit Card

High Volume Bids Welcome

©1995 CDW® Computer Centers, Inc

COMPUTER DISCOUNT WAREHOUSE®

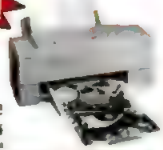
COMPUTER DISCOUNT WAREHOUSE™

COMPUTER DISCOUNT WAREHOUSE™

Canon

TOP SELLER!

Canon BJC-600e
Color BubbleJet printer



- 720 x 360 dpi black printing
- 360 dpi 24-bit (16.7 million) color printing
- 1 ppm color graphics printing-fast: class
- 4 individually-replaceable ink tanks
- Auto sheet feeder: 100 sheets letter or legal, 10 envelopes
- Includes Canon Color Advisor color enhancement software and Stationary Store

CDW ..... **$457.98** CDW 47834

WHY PAY RETAIL?

CDW® Sells For Less

U.S. Robotics

FREE V.34

Sportster V.34
28.8K bps data/fax modem

- True V.34: transmit data twice as fast as 14,400 bps modems
- High-speed protocols: V.34 (28.8K bps), V.FC (28.8K bps), V.32bis (14.4K bps)
- V.42 and MNP 2-4 error correction
- V.42bis and MNP 5 data compression
- 7 LED status lights, external volume control
- Includes fax and data software
- 5 year warranty, made in USA

Internal ..... **$224.90** CDW 45115
External ..... **$242.06** CDW 45114
*Offer ends 6/30/93, call for details

HARDWARE, SOFTWARE & PERIPHERALS AT DISCOUNT PRICES

NETWORKING PRODUCTS

NOVELL

Netware V2.1

5 User CD	636.00
10 User CD	1439.00
25 User CD	3125.00
50 User CD	3865.00
100 User CD	3999.00

Netware V3.12

5 User 3.5"	816.44
10 User 3.5"	1397.43
25 User 3.5"	2064.22
50 User 3.5"	2786.57
100 User 3.5"	3860.84

3Com

3C503 Etherlink II coax	192.44
3C509B Etherlink III coax	174.14
3C509B Etherlink III coax 5pk	1
3C509B Etherlink III 10BT	174.14
3C509B Etherlink III 10BT 5pk	1
3C509B Etherlink III combo	1
3C509B Etherlink III combo 5pk	1
3C579 Etherlink EISA coax	1
3C579 Etherlink EISA 10BT	1
3C1627 12 port Linkbuilder 10BT	1

ARTISOFT

NodeRunner 2000A	218.86
NodeRunner 2000T	199.06
NodeRunner 2000C	199.06
NodeRunner/SI 2000A	87.13
NodeRunner/SI 2000T	73.82
NodeRunner/SI 2000C	73.82
LANtastic V6.0	79.50
LANtastic V6.0 5 user	329.67
LANtastic V6.0 Starter Kit	229.13
Central Station III	199.13
Simply LANtastic starter kit	163.79
T-Runner 8 port 10BT	179.99
T-Runner 12 port 10BT	199.87

ASP

Multiprotocol print server 10BT HP MIO	247.75
Multiprotocol print server 10BT pocket	287.30
Multiprotocol 2 printer server combo	309.61
Multiprotocol 4 printer server combo	499.82
SNAP starter kit-2 computers, 1 printer	119.10
SNAP add-on transmitter	49.50
Fax Authority Solo network fax server	499.88
IBM Token Ring 16/4 MCA	296.73
IBM Token Ring 16/4 ISA	299.84
IBM Token Ring MAU	409.86

intel.

EtherExpress PRO/100Mbps PCI	218.19
EtherExpress PRO/100Mbps EISA	329.82
EtherExpress PRO/10 Fish 10BT	115.07
EtherExpress PRO/10 Fish 10BT 5pk	482.72
EtherExpress PRO/10 Fish combo	115.07
EtherExpress PRO/10 Fish combo 5pk	505.88
EtherExpress 16 coax	99.33
EtherExpress 16 coax 5pk	454.13
EtherExpress 16 10BT	99.33
EtherExpress 16 10BT 5pk	454.13
EtherExpress 16 10BT 20pk	1660.38
EtherExpress MCA 10BT	164.57
EtherExpress 16 combo	116.77
EtherExpress 16 combo 5pk	549.72
EtherExpress Flash 10BT	111.88
EtherExpress Flash 10BT 5pk	519.90
EtherExpress Flash combo	129.79
EtherExpress Flash combo 5pk	599.82
TokenExpress 16/4	349.94
NetportExpress II 10BT	388.86

MICRODYNE

Eagle NE2000+ coax	70.63
Eagle NE2000T+ 10BT	89.45
Eagle NE2000+ combo	95.40
NE3200 EISA 10BT	416.07
NE3200 EISA coax	415.07
IRMAtrac 4/16Mpbs ISA Convertible	455.25
IRMAtrac 4/16Mbps ISA Hardtop	289.23

NETWORKING PRODUCTS

SMC

Ultra16 Ethernet coax	94.96
Ultra16 coax 8pk	509.88
Ultra16 Ethernet 10BT	94.96
Ultra16 10BT 8pk	459.23
Ultra16 10BT 24pk	1573.71
Ultra16 Ethernet combo	107.71
Ultra16 combo 6pk	568.15
EtherCard+ Elite combo	139.57
TigerHub TP6 6 port + AUI	189.78
TigerHub TP6B 6 port + BNC	189.83
TigerHub TP12 12 port + AUI	379.79
3608 Ethernet 8 port hub 10BT	296.85
3612 Ethernet 12+2 port hub 10BT	548.55
PC600WS ARCNET coax	119.82
PC650WS ARCNET TP	119.88
ARCNET 8 port active hub coax	229.41
TokenCard Elite 16/4	249.88

TRENDWARE

TC5143 Ethernet 10BT	72.88
TC5143 Ethernet 10BT 8pk	569.94
TC6242 ARCNET 8-bit coax	66.86
TC6245 ARCNET coax	179.99
TC6040 ARCNET passive 4 port hub coax	39.50
TC5055 Ethernet 8 port hub 10BT	339.47
TC4045 Token Ring 16/4	299.75

CDW Carries the Complete Line of TCNS Products. Call for Details.

TERMINALS

Link MC8 amber/green/white	233.55
Link MAX900 amber/green/white	309.75
Link MC80 14" color	419.50
Wyse 55 amber/green/white	223.21
Wyse 60 amber/green/white	279.60
Wyse 160 amber/green/white	329.88

Xircom

PE310BC pocket Ethernet coax	309.99
PE310B2 pocket Ethernet coax	267.80
PE310BT pocket Ethernet 10BT	268.31
PT310CTP pocket Token Ring III	455.89
PPX03 Parallel port multiplexor	77.80
PS-CE2 PCMCIA Ethernet 10BT	177.54
PS-CE2 PCMCIA Ethernet combo	232.45
PS-CE2 PCMCIA Token Ring	449.18

TAPE & REMOVABLE MEDIA DRIVES

COLORADO

Jumbo 250 internal	148.35
Jumbo 360 internal	169.82
Jumbo 700 internal	266.58
Jumbo 1400 internal	359.67
Trakker 250 parallel port	275.44
Trakker 360 parallel port	328.91
Trakker 700 parallel port	405.78
Powertape 2 4GB SCSI internal	937.58
Powertape 2 4GB SCSI external	1077.99
PowerDAT 4GB SCSI internal	998.79

iomega

Zip drive 100MB parallel interface	199.95
Zip drive 100MB SCSI interface	199.95
Zip disks 100MB 3pk	49.95
Ditto 420MB tape drive internal	183.66
Ditto 850MB tape drive internal	217.82
Tape250 250MB internal	136.36
Tape510 510MB internal	279.93
Bernoulli 230MB Insider SCSI	419.78
Bernoulli 230MB Transportable	454.44
Bernoulli 230MB cartridge	99.81

MICROSOLUTIONS

Backpack 3.5" 1.44MB floppy parallel	146.32
Backpack 5.25" 1.2MB floppy parallel	155.28
Backpack 250MB tape backup parallel	287.58

TAPE & REMOVABLE MEDIA DRIVES

CONNER

Tape*Stor 250MB internal	161.86
Tape*Stor 420MB internal	181.17
Tape*Stor 420MB parallel port	337.20
Tape*Stor 850MB internal	273.25
Tape*Stor 850MB parallel port	429.96
Tape*Stor 4GB internal IDE	536.78

Mountain.

Flyer 340MB IDE internal	313.53
SideCar II 305MB parallel	309.44
1200-II 4GB SCSI external	1678.88

MULTIMEDIA AND CD

Creative Labs

Digital School House CD 2X kit internal	299.96
Edutainment CD 2X kit internal	439.16
Game Blaster CD 2X kit internal	389.64
SoundBlaster value edition	49.37
SoundBlaster Pro value edition	72.88
SoundBlaster 16 value edition	98.95
SoundBlaster 16 MCD	148.95
SoundBlaster 16 SCSI-2	178.95
SoundBlaster 16 ASP MCD	178.95
SoundBlaster 16 ASP SCSI-2	198.95
SoundBlaster AWE32 value edition	228.39
SoundBlaster AWE32	298.95

Acoustic Res PPS70 speakers 35W	249.07
Acoustic Res PP822 spkrs/subwoofer	199.86
Chinon CDS535 CD-ROM kit internal	249.73
Chinon CDX535 CD-ROM kit external	347.88
Diamond 4000 Quad CD kit internal	299.71
Diamond 5000 Quad CD kit internal	449.89
Ensoniq Soundscape wavetable	188.88
Jensen JPS35 speakers 5W	54.86
Jensen JPS45 speakers 10W	89.93
Logitech SoundMan Wave	119.40
Microsolutions 4X CD parallel	367.86
NEC 2Vi	189.68
NEC 2V Deluxe	296.88
NEC 3Xp Plus	384.84
NEC 3Xp Plus Kit	488.93
NEC 4Xi	379.54
NEC 4Xi Kit	440.70
NEC 4Xe	479.88
NEC 4Xe Kit	540.33
Pioneer DRM604X 4X 6 disc	699.88
Pioneer DRM1804X 4X 18 disc	1099.88
Plextor 4plex quad external	559.86
Plextor 4plex quad internal	499.84
Sigma Designs RealMagic Lite	269.93
Sigma Designs RealMagic	379.89
Sigma Designs RealMagic CD Kit	699.41
Sony CDU-55E 2X internal	119.84
Sony CDU-555 SCSI 2X internal	166.38
Sun Moon Star CD 2X kit internal	149.79
Sun Moon Star CD 2X kit internal w/sound	211.76
Teac SuperQuad 4X internal	239.01
Toshiba 3501 SCSI 4X internal	307.57
Toshiba 3501 SCSI 4X external	439.48
Turtle Beach Monte Carlo	93.86
Turtle Beach Tropez	193.87
Turtle Beach Monterey	307.77

DIGITIZERS & SCANNERS

CalComp

DB III 12X12 4 button	239.47
DB III 12X12 16 button	239.47
DB III 12X12 pressure pen	399.97
Drawing Slate II 12X12 4 button cordless	327.88

DIGITIZERS & SCANNERS

EPSON

ActionScanner II 6x6	499.00
ES-1200-ProPC	1237.38

HEWLETT PACKARD

ScanJet 3P	467.40
ScanJet 3P document feeder	179.57
ScanJet IICX W/ISA interface	359.88
ScanJet IICX document feeder	468.60
ScanJet IICX transparency adapter	833.28

MICROTEK

Scanmaker IIG grayscale	383.67
Scanmaker II color	523.84
Scanmaker IISP color	765.36
Scanmaker IIHR color	1064.80
ScanMaker III color	2409.95
Scanmaker 35T slide scanner	978.72

Summagraphics.

Summasketch III 12 X 12 16 button	218.56
Summasketch III 18 X 12 4 button	524.44

MONITORS

Mag Innovision DX15F	339.00
Mag Innovision MX15F	457.44
Mag Innovision DX17F	639.73
Mag Innovision MXP17F	896.97
Mag Innovision MX21F	1679.77
Magnavox CM2089 14" .28	227.88
Magnavox CM2099 14" .28 NI	247.44
Magnavox CM2015 15" 1024	298.88
Magnavox CM4015 15" 1280	347.61
Magnavox CM4017 17" .31	609.25
Magnavox CM4018 17" .28	639.83
Magnavox 20CM84 20"	999.00
NEC XV14 14"	309.63
NEC XV15 15"	426.48
NEC XV17 17"	729.95
NEC XE15 15"	526.80
NEC XE17 17"	946.72
NEC XE21 21"	1926.86
NEC XP15 15"	626.40
NEC XP17 17"	1196.84
NEC XP21 21"	2447.49
Samsung 3 14"	225.85
Samsung 15GL 15"	358.75
Samsung 17GLs 17"	859.82
Sony CPD-1425 14"	319.33
Sony 15SF 15"	439.27
Sony 17SF1 17"	879.46
Sony 20SE1 20"	1995.00
ViewSonic 15G 15"	387.95
ViewSonic 17G 17"	719.78
ViewSonic 21PS 21"	1693.70

VIDEO CARDS

ADS VGA to TV Elite internal	134.89
ADS VGA to TV Elite external	198.83
ATI Graphics Xpression ISA 2MB	209.44
ATI Graphics Xpression VLB 2MB	209.44
ATI Graphics Xpression PCI 2MB	209.44
ATI Graphics Pro Turbo ISA 2MB	378.70
ATI Graphics Pro Turbo VLB 2MB	378.70
ATI Graphics Pro Turbo PCI 2MB	378.70
ATI Graphics Pro Turbo PCI 4MB	589.99
Diamond SpeedStar Pro ISA 1MB	95.99
Diamond SpeedStar 64 ISA 2MB	183.88
Diamond Stealth 64 VLB 2MB VRAM	316.64
Diamond Stealth 64 PCI 2MB VRAM	316.64
Hercules Dynamite Pro ISA 1MB	153.40
Hercules Dynamite Pro ISA 2MB	197.48
Hercules Dynamite Power VLB 1MB	149.36
Hercules Dynamite Power VLB 2MB	198.29
Hercules Terminator 64 PCI 2MB	339.93
Hercules Terminator 64 VLB 2MB	326.97
Intel Smart Video Recorder Pro	388.99

If You Find a Better Price, Call CDW Before You Buy (800) 326-4CDW

NASDAQ
BUY WITH CONFIDENCE
CDW® IS A NASDAQ TRADED COMPANY
TICKER SYMBOL: CDWC
D & B Rated 5A1

No Surcharge For Credit Cards

CDW® TELEPHONE HOURS
Sales 7:00 -6:00 CST Mon-Fri.
8:00-5:00 CST Sat.
Tech Support for Customers
8:00-7:00 CST Mon-Fri.
8:00-5:00 CST Sat.

MOST ORDERS SHIP THE SAME DAY

CDW Computer Centers, Inc. • 1020 E. Lake Cook Road • Buffalo Grove, IL 60089

COMPUTER DISCOUNT WAREHOUSE™

CDW

Intel OverDrive® Processors

Power up to a new performance level

Add an Intel Pentium™, IntelDX4™, or IntelDX2™ OverDrive® processor to your Intel486™ CPU-based and run your applications at amazing speeds. To find out which OverDrive CPU is right for your application, call your CDW account executive today.

As low as.....**$125.68** CDW 39783

WHY SETTLE FOR LESS?

CDW® SERVICES YOU BETTER

Megahertz XJ1144 PCMCIA Fax Modem with XJACK®

◆ Rugged XJACK® connector pops out for use and back in for travel ◆ XJACK® connector eliminates bulky cables and podules ◆ V.32bis (14.4K bps) data, 14.4K bps send/receive fax ◆ Auto installation, hot swapable ◆ Advanced Error Correction ◆ 5-year warranty

ONLY.....**$169.55** CDW 27680

CDW® CARRIES OVER 20,000 PRODUCTS. IF YOU DON'T SEE IT, CALL!

COMPUTERS

TOSHIBA

T2100 DX2/50 250MB mono	1449.02
T2100CS DX2/50 330MB dual clr	2254.13
T2100CT DX2/50 330MB act color	3099.30
T2150CS DX4/75 500MB pas color CD	3599.81
T2150CT DX4/75 500MB act color CD	4696.22
T1960CS 200MB dual color	1999.98
T1960CS 320MB dual color	2134.70
T1960CT 200MB act color	2431.18
T1960CT 320MB act color	2619.09
T2400CS 250MB dual color	2272.16
T2400CS 320MB dual color	2442.18
T2400CT 320MB act color	2998.80
T2450CT 320MB act color	3939.30
T2450CT 500MB act color	4231.29
T2600CT 500MB act color	3709.26
T4700CT 320MB act color	2998.45
T4800CT 500MB act color	3999.84
T4850CT 475 520MB act color	4349.65
T4900CT P75 772MB act color	5448.26

AST

Ascentia 910N 4/50D 340MB pas color	2759.82
Ascentia 910N 4/75 510MB pas color	3149.90
Ascentia 910N 4/75 510MB act color	4094.00
Ascentia 910N 4/75 710MB act color	4478.55
Advantage! 6056d 4/66 540MB CD	1095.06
Advantage! 6090p 5/60 540MB CD	1624.79
Advantage! 8075p 5/75 1GB CD	1988.12
Advantage! 8090p 5/90 1GB CD	2249.81
Advantage! 8100p 5/100 1GB CD	2469.93
Bravo MS 4/68 270MB	1499.87
Bravo MST 5/90 540MB	2256.78

Canon

Innova Media 4/66 420MB MT	1199.99
Innova Media 5/60 420MB MT	1799.00
Innova Media 5/90 540MB MT	1999.96

IBM ThinkPad Portables

701CS DX2/50 360MB dual color	3799.00
701CS DX2/50 540MB dual color	4149.00
701CS DX4/75 360MB act color	5299.00
701CS DX4/75 540MB act color	5649.00
380C 4/33SX 340MB act color	1999.00
380CSE DX2/50 540MB pas color	2849.00
380CE DX2/50 170MB act color	2799.00
380CE DX2/50 340MB act color	2999.00
380CE DX2/50 540MB act color	3349.00

PC300 Series desktops

PC330 DX2/50 8MB, 364MB	1374.00
PC330 DX2/66 8MB, 364MB	1466.00
PC330 5/60 16MB, 540MB	2225.00
PC350 DX2/66 8MB, 540MB	1645.00
PC350 DX4/100 8MB, 540MB	1926.00
PC350 5/60 8MB, 364MB	1875.00

NEC

Versa V 4/50 250MB dual color	2362.25
Versa V 4/50 250MB act color	2882.80
Versa V 4/50 340MB act color	3047.57
Versa V 4/50 540MB act color	3428.27
Versa M 4/75 250MB dual clr	3033.07
Versa M 4/75 340MB dual clr	3142.66
Versa M 4/75 340MB act clr	3755.78
Versa M 4/75 340MB true clr	4039.85
Versa M 4/75 540MB act clr	4038.78
Versa M 4/75 540MB hi-res clr	4418.29
Versa M 4/100 340MB act color	4087.57
Versa M 4/100 810MB act color	4745.20
Versa M 4/100 540MB hi-res color	4745.20
Versa M 4/100 540MB true color	4849.44
Versa M 4/100 810MB hi-res clr	5124.48
Ready 4/33S 270MB CD	1336.21
Ready 4/66 340MB CD	1486.05
Ready 4/66M 420MB 2X CD	1494.74
Ready 5/60M 420MB 2X CD	1653.37

COMPUTERS

TEXAS INSTRUMENTS

TM4000M 4/50SX 200MB dual color	2063.66
TM4000M 4/50DX 340MB dual clr	2137.72
TM4000M 4/50DX 455MB act clr	2647.87
TM4000M 4/75 344MB act color	3069.82
TM4000M 4/75 455MB dual color	2818.42
TM4000M 4/100 524MB act color	4256.25
TM5000 5/75 524MB dual clr	5099.72
TM5000 5/75 810MB active clr	5699.80

DOT MATRIX & LASER PRINTERS

OKIDATA

184 Turbo	219.14
ML320	299.88
ML321	427.40
ML380	212.43
ML395	966.07
ML395C	1039.74
ML520	365.77
ML521	486.27
ML590	427.71
ML591	579.12
Pacemark 3410	1213.95
OL400E	399.98
OL410E	539.89
OL410E/PS	
4ppm 600dpi	759.86
OL810	904.98
OL830 Plus	1076.51
OL850	1189.80

Canon

BJ100	209.99
BJ10SX	244.88
BJ200ex	229.86
BJ230	388.00
BJC600e color	457.98
BJC4000 720dpi + color	348.78

EPSON

AP2250	96.64
AP3250	146.45
AP3280	167.82
LX300	165.65
FX870	288.45
FX1170	366.33
AP5000+	229.71
LQ1070+	375.26
LQ870	454.44
LQ1170	623.51
LQ2550	985.08
DFX5000 Plus	1384.01
DFX8000	2322.45
Stylus 300	183.16
Stylus 400	194.89
Stylus 800+	211.14
Stylus 1000	438.15
Stylus Color	509.53
ActionLaser 1100	383.62
ActionLaser 1400	582.40
ActionLaser 1500	456.82
ActionLaser 1600	785.75

IBM LEXMARK LASER PRINTERS

WinWriter 100 inkjet	287.98
WinWriter 200 laser	449.61
WinWriter 400 laser	755.03
WinWriter 600 laser	999.00
ValueWriter 300 (4037 SE 5PPM)	644.87
ValueWriter 800 laser	815.87
Optra R 600dpi laser	1426.89
ExecJet IIc	315.78

Panasonic

1150	133.49
1624	365.20
2023	182.27
2130	204.40
2135 Color	247.45
KXP2624	409.49
3123	249.00
4400 Laser	454.90
5400 Laser	495.53
KX-SP100 printer/fax/copier	799.84

TEXAS INSTRUMENTS

microMarc Color inkjet	334.76
microWriter PS23	639.65
microLaser Pro 600 PS23	1197.02
microLaser Pro E	1395.49
microLaser Power Pro 600 PS85	1629.60

HEWLETT PACKARD

OfficeJet inkjet fax/copier/printer	779.59
DeskJet 540	289.75
DeskJet 560C	479.89
DeskJet 1200C	994.48
DeskJet 1200C PS	1599.49
LaserJet 5P	CALL!
LaserJet 4MP	1387.21
LaserJet 4 plus	1449.98
LaserJet 4Si	2998.95
LaserJet 4V	1967.38
LaserJet Color	5929.62

COSTAR

LabelWriter XL DOS/Win	139.86
LabelWriter XL Plus DOS/Win	224.89

HARD DRIVES & CONTROLLERS

Maxtor

270MB Fast-ATA	169.54
345MB SCSI-2	189.88
420MB Fast-ATA	199.87
540MB Fast-ATA	232.84

MICROPOLIS

2217 1.7GB SCSI-2	994.51
4221 2.1GB SCSI-2	1088.48
3243 4.3GB SCSI-2	1659.95
1936 3GB SCSI-2	1275.17

CONNER

425MB IDE	214.29
540MB IDE	249.80
850MB Fast-ATA	299.98
1.27GB Fast-ATA	427.75

All Conner drives listed include complete installation hardware and software

Seagate

428MB Fast-ATA	199.97
545MB Fast-ATA	224.06
722MB Fast-ATA2	265.46
1GB Fast-ATA2	415.54
1.0GB SCSI-2	584.36

WESTERN DIGITAL

Caviar 420MB EIDE	195.19
Caviar 540MB EIDE	256.90
Caviar 730MB EIDE	279.08
Caviar 1GB EIDE	437.47
Caviar 1.2GB EIDE	496.49

CONTROLLERS

Acculogic SIDE-3+ w/on-board BIOS	48.90
Acculogic SIDE-4+ w/par, 2ser, game	35.06
Acculogic SIDE-4VL EIDE, 16550 serial	89.76
Acculogic ISAport SCSI-2	121.60
Adaptec AVA1505 SCSI 2 CD Kit	54.95
Adaptec AHA1542CF SCSI-2	265.45
Adaptec AVA2825 VLB SCSI-2/EIDE	166.87
Adaptec 2842 VLB SCSI-2	249.83
Promise 2300+ EIDE VLB	59.87

MODEMS & COMMUNICATIONS

U.S. Robotics

SPORTSTER MODEMS

V.34 28.8K internal w/fax	224.90
V.34 28.8K external w/fax	242.06
14.4K internal w/fax	94.81
14.4K external w/fax	111.00

COURIER MODEMS

V.34 internal w/fax	387.60
V.34 external w/fax	422.32

Hayes

ACCURA 144 internal w/fax	92.73
ACCURA 144 external w/fax	111.18
ACCURA 288 V.34 internal w/fax	183.76
ACCURA 288 V.34 external w/fax	218.88
OPTIMA 144 external w/fax	374.30
OPTIMA 144 pocket w/fax	296.93
OPTIMA 288 V.34 internal w/fax	365.14
OPTIMA 288 V.34 external w/fax	406.55

PRACTICAL PERIPHERALS

14.4 internal w/fax	89.98
14.4 Mini Tower w/fax	109.02
V.34 28.8 internal w/fax	196.59
V.34 28.8 Mini Tower w/fax	209.64
Practical Pro Series	CALL!

BOCA

Online Express 14.4 internal w/fax	64.25
Online Express 14.4 external w/fax	79.78
V.34 28.8 internal w/fax	164.44
V.34 28.8 external w/fax	209.90

MICROCOM

Deskporte ES 14.4	146.39
Deskporte Fast ES V.FC 28.8	179.94
Deskporte Fast EP V.FC 28.8	248.24

BATTERY BACKUP AND UPS

American Power Conversion

BackUPS 280	99.53
BackUPS 400	144.28
BackUPS 450	175.81
BackUPS 600	243.00
BackUPS 900	345.76
BackUPS 1250	449.29
SmartUPS 400	299.69
SmartUPS 600	363.38
SmartUPS 900	514.51
SmartUPS 1250	644.24
SurgeArrest Network	33.25
SurgeArrest Pro	29.45
SurgeArrest Network + Phone	49.98
Line-R 600	119.09

Tripp Lite

BC250	94.97
BC400	138.91
BC500	173.09
BC500 LAN	177.51
BC600 LAN	231.43
BC750 LAN	289.03
BC900 LAN	327.59
BC1250 LAN	426.10

Tripp Lite Smart UPS Series

SMART 250 LAN	216.30
SMART 400 LAN	273.94
SMART 500 LAN	289.77
SMART 600 LAN	313.69
SMART 750 LAN	365.14
SMART 900 LAN	455.07
SMART 1250 LAN	569.41
Isobar 4 OUTLET	38.95
Isobar 6 OUTLET	46.38

PCMCIA CARDS

3Com Etherlink IIIB combo	214.65
Hayes EZJack 14.4 w/fax	179.48
Hayes EZJack V.34 w/fax	299.87
IBM Token Ring 16/4	399.97
Linksys Ethernet combo	165.74
Megahertz 14.4K data/fax	179.48
Megahertz XJack 14.4 data/fax	169.55
Megahertz XJack Gold 14.4 data/fax	198.89
Megahertz V.34 XJack data/fax	353.09
New Media Bus Toaster SCSI-2 host	219.98
New Media Wave Jammer sound card	229.48
New Media Multimedia Combo	339.80
Simple Tech 14.4K data/fax modem	145.51
Simple Tech 14.4K modem + voice	149.84
Simple Tech SCSI adapter	145.51
Simple Tech 130MB hard drive	368.36
Simple Tech 170MB hard drive	404.60
Adaptec APA1460 SCSI-2	217.98
Turtle Beach Audio Advantage	129.38
USR Sportster 14.4K	178.90
USR Sportster V.34	348.78
Xircom Ethernet 10BT	177.54
Xircom Ethernet combo	232.45
Xircom Ethernet+modem 10BT	449.82
Xircom Ethernet+modem combo	487.57
Xircom Token Ring 16/4	449.18

INTEL OVERDRIVE

Intel OverDrive DX2/50	125.68
Intel OverDrive DX2/66	188.68
Intel OverDrive DX4/75	228.55
Intel OverDrive DX4/100	297.74
Intel OverDrive Pentium 63MHz	395.45

MEMORY UPGRADES

Simple

Lifetime Warranty!

AST Ascentia 910N 4MB	CALL!
AST PowerExec 4/33SL 4MB	CALL!
AST PowerExec 4/33SL 16MB	CALL!
HP LaserJet 4L 1MB	CALL!
HP LaserJet 4P 4MB	CALL!
HP LaserJet 4 4MB	CALL!
HP LaserJet 4 8MB	CALL!
IBM ThinkPad 500 4MB	CALL!
IBM ThinkPad 500 8MB	CALL!
IBM ThinkPad 755 4MB	CALL!
IBM ThinkPad 755 8MB	CALL!
Toshiba 1900-4600 4MB	CALL!
Toshiba 1900-4600 8MB	CALL!
Toshiba 1900-4600 16MB	CALL!
Toshiba 4700/4800 32MB	CALL!
NEC Versa 4MB	CALL!
NEC Versa 8MB	CALL!

Please call for other applications.
Call today for current pricing and availability!

COMPUTER DISCOUNT WAREHOUSE™

FREE TECHNICAL SUPPORT FOR CDW® CUSTOMERS

CDW® Sells for Less and Services You Better!

(800) 326-4CDW

FAX (708) 465-6800

©1995 CDW® Computer Centers, Inc. PCM1245

CALL FOR FREE CDW® CATALOG

Internet: info@cdw.com

COMPUTER DISCOUNT WAREHOUSE

WHY PAY RETAIL? CDW® Sells For Less !

COMPUTER DISCOUNT WAREHOUSE

TOSHIBA

NEW!

Satellite Pro T2150CD Series

High-performance multimedia value

The Satellite Pro™ T2150CD Series delivers built-in CD-ROM functionality, optimal multimedia capability, affordable mass storage, and quick data retrieval.

✔ IntelDX4™ 75MHz CPU ✔ 4MB RAM std., 28MB max. (T2150CDS) or 8MB RAM std., 32MB max. (T2150CDT) ✔ Displays: 10.4" dual-scan color (T2150CDS) or 10.4" active-matrix color (T2150CDT) ✔ Local bus video with graphics accelerator ✔ 1MB video RAM ✔ Integrated double-speed CD-ROM ✔ Built-in 16-bit audio, Sound Blaster Pro™ compatible with MIDI and .WAV support ✔ PCMCIA slot: accepts two Type II or one Type III card ✔ Ports: serial, parallel, external monitor, external disk drive, PS/2 keyboard ✔ Optional port replicator for convenient desktop use ✔ Built-in microphone, headphone, and line-in jacks ✔ AccuPoint™ integrated pointing device ✔ NiMH battery, 2.5 hours life, MaxTime® power management ✔ Pre-loaded MS-DOS®, Windows® for Workgroups and more ✔ Three year warranty

T2150CDS 500MB	$3599.81	CDW 51893
T2150CDT 500MB	$4696.22	CDW 51894

TOSHIBA

NEW!

Satellite T2100 Series

Power made affordable

Toshiba's Satellite® T2100 Series notebook computers pack high-performance, expandability and portability into a sleek and lightweight design.

◆ IntelDX2™ 50MHz CPU ◆ 4MB RAM std. 28MB max. (T2100, T2100CS) or 8MB RAM std. 32MB max. (T2100CT) ◆ 250MB or 330MB hard disk drive ◆ Choice of displays: 10.4" dual-scan color (T2100CS), 8.4" active matrix color (T2100CT) or 9.5" dual-scan mono (T2100) ◆ Local bus video ◆ 1MB video RAM (T2100CS, T2100CT) ◆ PCMCIA slot: accepts two Type II or one Type III card ◆ Ports: serial, parallel, external monitor, PS/2 keyboard ◆ Optional port replicator for convenient desktop use ◆ Full-size 82-key keyboard with AccuPoint integrated pointing device ◆ NiMH rechargeable battery pack, 2.5+ hours life, MaxTime® power management ◆ Built-in power supply, no external A/C adapter required ◆ Pre-loaded MS-DOS® and Windows® ◆ Weighs less than 7 lbs. ◆ One year U.S. and international warranty

T2100 250MB	$1449.02	CDW 50879
T2100CS 330MB	$2254.13	CDW 50880
T2100CT 330MB	$3099.30	CDW 50881

TOSHIBA

NEW

Toshiba T2450CT

75MHz power in the office and on the road

◆ IntelDX4™ 75MHz CPU (3.3 volt and SL-enhanced) ◆ Integrated floating point math coprocessor, 16KB CPU cache ◆ 8MB RAM std., 32MB max. ◆ 9.5" TFT active matrix color display ◆ Supports simultaneous external VGA monitor, 1024 x 768 maximum resolution ◆ 2 PCMCIA slots: 5mm Type II and 14.5mm Type III and larger ◆ Ports: serial, parallel, SCSI-2, PS/2 mouse/keyboard, expansion bus, external monitor ◆ NiMH battery pack, 2+ hours life ◆ Pre-loaded MS-DOS®, Windows™ for Workgroups, Adaptec EZ-SCSI for Toshiba ◆ Three year warranty

320MB	$3939.30	CDW 48982
500MB	$4231.29	CDW 48983

TOSHIBA

SPECIAL PURCHASE

T4700CT

▼ IntelDX2™ 50MHz CPU ▼ 8MB RAM std., 24MB max. ▼ 320MB hard drive ▼ 9.5" active matrix color display ▼ 2 PCMCIA slots: 1) Type II and 1) Type III (16mm) ▼ Microsoft BallPoint Mouse 2.0 with QuickPort ▼ NiMH battery, 2+ hours life ▼ 3 year warranty (1 year on battery)

ONLY! $2998.45 CDW 33644

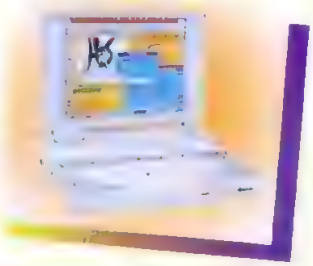
PRICE DROP!

TOSHIBA

Mobile Pentium T4900CT

Maximum performance color notebook

Pentium™ power with an explosion of multimedia!



✔ 75MHz Intel Pentium™ CPU (3.3 volt and SL-enhanced) ✔ Integrated floating point math coprocessor, 16KB CPU cache ✔ 8MB high speed RAM std., 40MB max ✔ High-perfromance 772MB hard drive ✔ Large active matrix color display: 10.4" diagonal ✔ Local bus video with graphics accelerator: 64K colors at 640 x480 ✔ Supports simultaneous display on external monitor ✔ 16-bit .WAV and MIDI sound capability: built-in microphone and speaker ✔ 2 PCMCIA slots: 5mm Type II and 10.5mm ✔ AccuPoint keyboard-integrated pointing device, QuickRead status icons ✔ Ports: serial, parallel, PS/2 mouse, PS/2 keyboard, expansion bus, external monitor, headphone/speaker, and microphone ✔ NiMH battery pack, 2+ hours life, Maxtime Power System ✔ Pre-loaded MS-DOS®, Windows for Workgroups, Windows Sound System ✔ Three year warranty

ONLY! $5448.26 CDW 47052

If You Find a Better Price, Call CDW® Before You Buy!

CDW Sells for Less and Services You Better!

(800) 326-4CDW

PCM1245

©1995 CDW® Computer Centers, Inc

ALWAYS WORKING TO KEEP YOUR COMPUTING NEEDS AHEAD!

COMPUTER DISCOUNT WAREHOUSE™

WHY PAY RETAIL? CDW® Sells For Less !

NEW NEW

IBM Aptiva
Multimedia desktop computers

The IBM Aptiva series is loaded with features and expansion capabilities to help make you ready for the multimedia applications of today and tomorrow.

Monitor sold separately

✔ 486DX2/66MHz CPU ✔ 540MB hard drive ✔ 4MB RAM std., 64MB max. (338, 350) ✔ 8MB RAM std., 128MB max. (535) ✔ Desktop case with 4 bays, 4 expansion slots (338, 535)
✔ Mini-tower configuration, 6 bays, 8 expansion slots (350) ✔ Local Bus graphics accelerator, 1MB video RAM ✔ Double-speed IDE CD-ROM drive ✔ Sound Blaster 16 audio card (338, 350) ✔ Aria 16 Wavetable audio card (535) ✔ Two stereo speakers ✔ 2400 bps fax/modem (338, 350) ✔ 14.4K bps fax/modem (535) ✔ Pre-installed software: IBM PC-DOS® V6.3, Microsoft Windows® V3.11, PFS: WindowWorks, Intuit Quicken and more ✔ 24-hour toll-free support, 3 year warranty

Aptiva 338 desktop	$1399.00	CDW 51270
Aptiva 350 mini-tower	$1499.00	CDW 51271
Aptiva 535 desktop	$1699.00	CDW 51269

IBM ThinkPad 701C
The no-compromise subnotebook

The IBM ThinkPad 701C family offers a revolutionary new expanding "butterfly" keyboard and large active-matrix color screen, all in a high performance, super lightweight subnotebook

✔ IntelDX4™ 75MHz or IntelDX2™ 50MHz CPU ✔ 4MB RAM std, 20MB max (IntelDX2 models) ✔ 8MB RAM, 24MB max. (IntelDX4 models) ✔ 360MB or 540MB removeable hard drive ✔ 10.4" active-matrix color display (701C) ✔ 10.4" dual-scan color display (701CS) ✔ Local bus video with 1MB RAM ✔ PCMCIA accepts 2) Type II or 1) Type III ✔ Built-in 14.4K bps fax/modem with voice and telephony functions ✔ Full size, 85-Key TrackWrite™ expandable keyboard ✔ Keyboard integrated TrackPoint III™ pointing device ✔ Rechargeable Super NiCD battery ✔ Optional MultiPort II port replicator or Dock II docking station ✔ Includes external 3.5" floppy drive ✔ Preloaded IBM PC DOS™ 6.3 and Windows® 3.11 ✔ Preloaded IBM OS/2 Warp V3.0 (IntelDX4 models) ✔ 3 year international warranty ✔ Lightweight and compact, 4.5 lbs, 9.7" x 7.9" x 1.7"

IntelDX2 50MHz			IntelDX4 75MHz		
701CS 360MB	$3799.00	CDW 51790	701CS 360MB	$4399.00	CDW 51794
701CS 540MB	$4149.00	CDW 51791	701CS 540MB	$4749.00	CDW 51795
701C 360MB	$4799.00	CDW 51788	701C 360MB	$5299.00	CDW 51792
701C 540MB	$5149.00	CDW 51789	701C 540MB	$5649.00	CDW 51793

ThinkPad 360 Series
Advanced design...powerful performance

SPECIAL PURCHASE

◆ i486SX/33 CPU (360C) ◆ IntelDX2™ 50MHz CPU (360CSE, 360CE) ◆ 4MB RAM std., 20MB max. ◆ 340MB or 540MB hard drive ◆ 9.5" dual-scan color display (360CSE) ◆ 8.4" active-matrix color display (360C, 360CE) ◆ Simultaneous external monitor support: 1024 x 768 maximum resolution ◆ Accelerated local bus video, 1MB RAM ◆ Removable hard drive, battery and floppy drive ◆ PCMCIA: accepts two Type II or one Type III ◆ Ports: enhanced parallel, serial, external keyboard/mouse/numeric keypad ◆ Preloaded software: PC-DOS V6.3, Microsoft Windows® V3.1, Lotus Organizer and more ◆ TrackPoint II pointing device ◆ NiMH rechargeable battery pack ◆ Weighs less than 6.5lbs ◆ 1 year warranty

360C, 340MB HD	$1999.00	CDW 43404
360CSE, 540MB HD.....	$2849.00	CDW 47003
360CE, 340MB HD	$2999.00	CDW 47005
360CE, 540MB HD	$3349.00	CDW 47006

If You Find a Better Price, Call CDW® Before You Buy!

CDW® Sells for Less and Services You Better!

(800) 326-4CDW

PCM1245

©1995 CDW® Computer Centers, Inc.

MOST ORDERS SHIP THE SAME DAY

COMPUTER DISCOUNT WAREHOUSE™

At last. A big-name p

You know Samsung as a leader in consumer electronics. The world's largest producer of DRAM. And a leader in R&D in the semiconductor industry. Why settle for a no-name notebook when you can have the world's 14th largest company standing behind your purchase?

SENS 700

Rugged dependability. Full business audio.

- Removable 2.5", 19mm height hard drive in your choice of capacity: 340, 520, 732MB
- Up to 36MB RAM capacity
- Internal 3.5" floppy disk drive
- Two PCMCIA Slots. One Type II and one Type III can be used simultaneously
- Parallel, serial, CRT, keyboard/keypad/mouse, cable manager, microphone jacks
- AT- compatible keyboard with built-in ergonomic track ball
- Full business audio with built-in mic. & speakers.
- Sparkling 10.4" color DSTN or 10.4" color Active Matrix TFT full size 640 x 480 display with 1 MB video RAM; local bus video/GUI accelerator; simultaneous LCD/CRT display
- Advanced Power Management System
- NiMH batts. operate up to 3-4 hrs; free AC voltage adapter
- Only 11.3"x 8.9"x 2.1" and 6.2 lbs (DSTN color)
- Free carrying case

N700,DX2/50, 10.4" color DSTN, 340MB HDD, 4MB RAM	$2,299
N700, DX4/75, 10.4"color DSTN, 520MB HDD, 4 MB RAM	$2,699
N700, DX4/75, 10.4" color DSTN, 520MB HDD, 8 MB RAM	$2,878
N700, DX2/50, 10.4" color Active Matrix TFT, 340MB HDD, 8 MB RAM	$3,178
N700, DX4/75, 10.4" color Active Matrix TFT, 520MB HDD, 8 MB RAM	$3,678
N700, DX4/100, 10.4" color Active Matrix TFT, 732MB HDD, 8 MB RAM	$4,078

Free. One Year Executive Support Program.
24-hour turnaround on repairs. Call for details.

intel inside

30-Day Money Back Guarantee, 2 year warranty on notebooks. Lifetime toll-free technical support. Complete with MS-DOS, Windows, BIOS shadowing, quick booting, and anti-virus software.

Design, prices and specifications are subject to change without notice. Photos may not represent actual product. 10% restocking fee on items returned for credit. All brand and product names are trademarks or registered trademarks of their respective companies. The Intel and Intel Inside logos are registered trademarks of the Intel Corporation. Intel 80486DX2/50, DX4/75, DX4/100 are trademarks of Intel Corporation. This device complies with FCC Class B, UL and CSA.

riced like a no-name.

NoteMaster S3945T

Top performance. Terrific price.

- Removable 2.5", 19mm height hard drive in your choice of capacity: 260, 340, 520, 732MB
- Internal 3.5" floppy disk drive
- Two PCMCIA Slots. One Type II and one Type III can be used simultaneously
- Parallel, serial, CRT, keyboard/keypad/mouse, cable manager
- AT-compatible keyboard
- Built-in ergonomic track ball
- Sparkling 9.4" color DSTN or 9.4" color active matrix TFT full size 640 x 480 display with 1MB video RAM; local bus video/GUI accelerator; simultaneous LCD/CRT display
- Advanced Power Management System
- NiMH batts. operate up to 3 hrs; free AC voltage adapter
- Only 11.3"x 8.9"x 2.1" and 6.2 lbs (DSTN color)
- Free carrying case

S3945T, DX2/50, 9.4" color DSTN, 260MB HDD, 4 MB RAM	$1,899
S3945T, DX2/50, 9.4" color DSTN, 340MB HDD, 4 MB RAM	$2,199
S3945T, DX4/75, 9.4" color DSTN, 520MB HDD, 4 MB RAM	$2,649
S3945T, DX2/50, 9.4" color Active MatrixTFT, 340MB HDD, 4 MB RAM	$2,446
S3945T, DX4/75, 9.4" color Active Matrix TFT, 520MB HDD, 8 MB RAM	$3,498
S3945T, DX4/75, 9.4" color Active Matrix TFT, 732MB HDD, 8 MB RAM	$3,678

SENSLite 200

Full business audio. Only 3.9 pounds.

- Easily accessible 2.5", 12.7mm height hard drive in your choice of 260, 340, 520MB
- External 3.5" floppy disk drive included free
- Two Type II PCMCIA lots; can be used simultaneously
- Parallel, serial, CRT, PS/2 keyboard/ keypad/mouse, cable manager
- AT-compatible keyboard
- Integrated, easy-to-use-in-tight-places pointing device
- Full business audio with built-in mic. and speakers
- Sparkling 8.3" color DSTN or 7.8" color active matrix TFT full size 640 x 480 display with 512K video RAM; local bus video/GUI accelerator
- Advanced Power Management System
- NiMH batts. operate up to 3 hrs; free AC voltage adapter
- Smaller than a letter-size sheet of paper: only 10.2" x 7.6"x 1.69" and weighs a scant 3.9 lbs (TFT color)
- Free carrying case

S200, DX2/50, 8.3" color DSTN, 260MB HDD, 4 MB RAM	$1,999
S200, DX4/75, 8.3" color DSTN, 520MB HDD, 4 MB RAM	$2,599
S200, DX2/50, 7.8" color Active Matrix TFT, 340MB HDD, 4 MB RAM	$2,799
S200, DX4/75, 7.8" color Active Matrix TFT, 520MB HDD, 8 MB RAM	$3,499

SAMSUNG ELECTRONICS

1-800-656-0840

CIRCLE 278 ON READER SERVICE CARD

MEMORY

FACTORY DIRECT PRICES

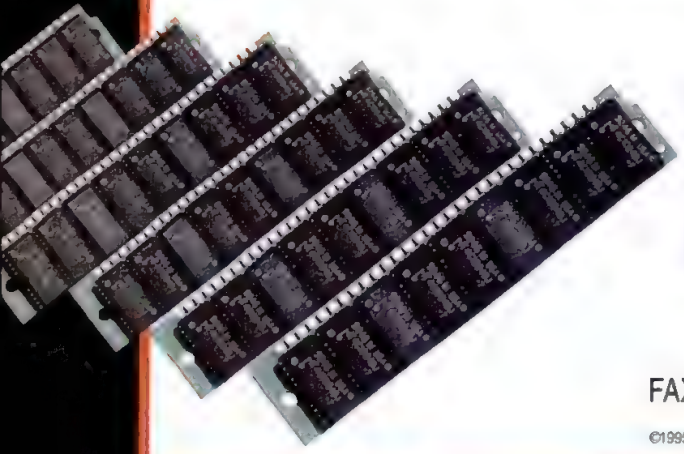
CALL MICRON MEMORY DIRECT!

Our knowledgeable sales staff will put you on the road to POWER!

1 X 8.....call	2 X 32.....call
1 X 9.....call	2 X 36.....call
4 X 8.....call	4 X 32.....call
4 X 9.....call	4 X 36.....call
1 X 32.....call	8 X 32.....call
1 X 36.....call	8 X 36.....call

MAC UPGRADES ALSO AVAILABLE.

- FACTORY DIRECT PRICING
- INSTALLATION INSTRUCTIONS INCLUDED
- U.S.A. MADE QUALITY AND RELIABILITY
- 30-DAY MONEY BACK GUARANTEE
- SAME DAY SHIPPING ON MOST ORDERS
- VISA, MC, AMEX ACCEPTED



MICRON
COMPUTER, INC.

800-219-2283

MON-FRI 7AM - 6PM / SAT 9AM - 3PM (MT)
915 E. Karcher Road • Nampa, Idaho 83687
FAX (208) 465-1740 Purchase Order FAX (208) 465-1740

©1995 Micron Computer, Inc. All rights reserved. All prices and specifications subject to change without notice
Micron Computer, Inc. cannot be responsible for omissions, errors in typography or photography

CIRCLE 203 ON READER SERVICE CARD

JUST THINK OF US AS A DELICATESSEN. ONLY WE MAKE HERO NOTEBOOKS.

STARTER SET

- Big 9 1/2" monochrome screen
- 4MB OF RAM memory
- DX2/66MHz processor
- 340MB hard drive

Only **$1499**

(Add $100 for DX4/75)

ECONO COLOR

- Big 9 1/2" dual-scan color screen
- 4MB OF RAM memory
- DX2/66MHz processor
- 340MB hard drive

Only **$1949**

(Add $100 for DX4/75)

MAD MAX

- Big 9 1/2" TFT active-matrix color screen
- 8MB OF RAM memory
- DX4/75MHz processor
- 520MB hard drive

Only **$2899**

(Add $100 for DX4/100)

Included With Every EzBook

■ 16-bit stereo sound, speaker, microphone ■ Free 9600 Baud Hayes compatible fax/modem PCMCIA card ■ Long-life, hot-swap batteries ■ Free Microsoft(ware) – Windows 3.1.1, M/S DOS operating system software ■ Free handsome, rugged carrying case ■ Upgradability – memory, disk, screens, CPU power ■ 84-key, full-function keyboard ■ 30-day, money-back guarantee*** ■ Built-in graphics BitBLT engine and video 1MB RAM ■ Two PCMCIA slots (III & II) ■ Built-in floppy drives ■ Serial and parallel ports

MAY WE PLEASE TAKE YOUR ORDER NOW?

How about a powerful 486 notebook computer with all these great features, but hold the active-matrix and DX4/100 chips?

Won't become obsolete.

Hot, new CTX EzBooks served up any way you want them now. And all ready for us to upgrade for you later as you need more power. We'll even pay the overnight shipping costs.* Shown above are three of our most popular configurations you can order by phone today and get two days later.**

Beyond that, you have a wide choice of processors from 486DX/66 to 486DX4/100s. RAM from 4 to 32MB. Hard disks from 340 to 520MB. Three screens. And a docking station with optional CD-ROM and all the slots and ports you can gobble up.

So get your MasterCard or Visa ready. Call MITRA to order your CTX EzBook 486 today. nowhere will you get better quality, more value, greater choice, or less risk. We guarantee it.

intel inside

Quantities Limited.
Call MITRA Direct Now.

800-324-1441

MITRA

DIRECT FROM CHANNEL GROUP

20504 Earlgate St., Walnut, CA 91789
Hours: Mon.–Fri. 7 to 7, Sat.–Sun. 9 to 6
(Pacific Time)

* Good for two times during the warranty period. ** After credit approval. *** Please call for details and/or restrictions. Images simulated. Logos are for photographic purposes only. © 1995 MITRA. All brand names are trademarks or registered trademarks of their respective owners.

CIRCLE 329 ON READER SERVICE CARD

One Portable CD-ROM Drive — Two Simple Steps

With the backpack quad-speed CD-ROM drive, you're one cable connection away from a world of multimedia business advantages: Plug it into your PC parallel port to access a universe of CD-ROM titles. Take it with you for portable data retrieval. Or share it with other PCs.

backpack

MicroSolutions

Call Toll Free - 800.293.1214

No compatibility problems with virtually any IBM-compatible PC—Windows, DOS or OS/2. No taking your PC apart to install this quad-speed drive. Just plug it into your PC printer port—plug your printer into the backpack. A simple solution from the backpack family of tape, diskette and hard drives.

"See Us At Spring COMDEX Booth #418"

132 W. Lincoln Hwy. Dekalb, Illinois 60115 • Telephone 815.756.3411 • FAX 815.756.2928 • **CDW** - 800.736.4239 • **Global Computer Supplies** - 800.845.6225
Inmac - 800.547.5444 • **Micro Warehouse** - 800.367.7080 • **PC Connection, Inc.** - 800.800.5555 • **PCs Compleat, Inc.** - 800.514.4727 • **USA Flex** - 800.872.3539
CIRCLE 855 ON READER SERVICE CARD

YOUR FIRST SOURCE FOR NOTEBOOK COMPUTERS!

T4700, T4800 and T4850

- Brilliant color display with local bus video
- 2 PCMCIA slots (Type II, Type III)
- Microsoft Sound System, built-in microphone audio out port
- MS-DOS, UltraFont, Indeo video compression software, Windows for Workgroups 3.11 and Run Time for Windows

Model	Processor	Ram	Screen	Hard Drive	Price
T4800CT	486DX4/75	8MB	9.5" Active	500MB	$4166
T4850CT	486DX4/75	8MB	10.4" Active	520MB	$4503
T4850CT	486DX4/75	8MB	10.4" Active	772MB	$4798

T3600CT PORTEGE™

- Integrated AccuPoint pointing device
- Ultra-portability at only 4.4 lbs.
- 4MB RAM expandable to 20MB
- PCMCIA Type II slot
- External 3.5" disk drive

PC MAGAZINE EDITORS' CHOICE

Model	Processor	Ram	Screen	Hard Drive	Price
T2400CS	486DX2/50	4MB	9.5" Dual Scan	250MB	$2273
T2400CS	486DX2/50	4MB	9.5" Dual Scan	320MB	$2443
T2400CT	486DX2/50	8MB	8.4" Active	250MB	$2934
T2400CT	486DX2/50	8MB	8.4" Active	320MB	$3005
T2450CT	486DX4/75	8MB	8.4" Active	320MB	$3956
T2450CT	486DX4/75	8MB	8.4" Active	500MB	$4251
T3600CT	486DX2/50	8MB	8.4" Active	500MB	$3704

T4900CT

- 75MHZ Mobile Pentium Processor
- 8MB RAM expandable to 40MB
- 772MB hard drive
- 10.4" active matrix color display
- 1 Type II and 1 Type III PCMCIA slots
- Accupoint integrated pointing device
- MS-DOS 6.21, Windows for Workgroups 3.11, Windows sound System 2.0, Indeo Video, and Run Time Video for Windows.

Only $6313

TOSHIBA

AST Authorized Systems Reseller

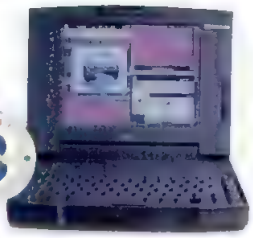
ASCENTIA 910N

New!

- 486 50Mhz or 75Mhz processor
- 2 Type II PCMCIA slots or 1 Type III PCMCIA slot
- Removable disk drive
- Dual scan or active matrix color screen

Processor	Ram	Screen	Hard Drive	Price
486DX2/50	8MB	10.3" Dual scan	340MB	$2729
486DX4/75	8MB	10.3" Dual scan	510MB	$3119
486DX4/75	8MB	10.4" Active	510MB	$4095
486DX4/75	8MB	10.4" Active	700MB	$4485

NEC VERSA V



- 4MB expandable to 20MB
- 2 Type II PCMCIA slots or 1 Type III PCMCIA slot
- MS-DOS 6.21, Windows 3.1, built-in trackball
- Removable hard drive
- Removable floppy - add second battery

Processor	Ram	Screen	Hard Drive	Price
486DX2/50	4MB	9.5" Dual scan	250MB	$2347
486DX2/50	4MB	9.5" Dual scan	340MB	$2488
486DX2/50	4MB	9.5" Active	250MB	$2864
486DX2/50	4MB	9.5" Active	340MB	$3004
486DX2/50	4MB	9.5" Active	540MB	$3380
486DX4/75	4MB	9.5" Active	340MB	$3380
486DX4/75	4MB	9.5" Active	540MB	$3755

TRAVELMATE 4000M MULTIMEDIA NOTEBOOKS!

TEXAS INSTRUMENTS

- Brilliant color display
- 16-bit sound card
- Integrated pointing device
- 2 Type II or 1 Type III PCMCIA slot

Processor	Ram	Screen	Hard Drive	Price
486DX2/50	4MB	9.5" Dual scan	340MB	$2110
486DX2/50	4MB	8.4" Active	455MB	$2617
486DX4/75	4MB	9.5" Dual scan	455MB	$2786
486DX4/75	4MB	8.4" Active	340MB	$3039
486DX4/100	4MB	9.5" Active	525MB	$4221
Pentium 75MHz	8MB	10.5" Dual Scan	500MB	$4981
Pentium 75MHz	8MB	10.4" Active	772MB	$5572

Starting At $2110

- Optional CD-ROM docking station (sold separately)

NEC VERSA M

- Upgradable hard drive
- High-Fidelity sound & microphone
- 2 Type II or 1 Type III PCMCIA slots
- Full color with over 65,000 colors

NEC

Great Value!

Processor	Ram	Screen	Hard Drive	Price
486DX4-75	8MB	9.5" Dual scan	250MB	$3023
486DX4-75	8MB	9.5" Active	340MB	$3803
486DX4-100	8MB	9.5" Active	340MB	$4131
486DX4-100	8MB	9.5" Active	810MB	$5014

First SOURCE International

Call the Notebook Experts

ORDER NOW

800-298-9866

International Orders Call 714-448-7750

CIRCLE 272 ON READER SERVICE CARD

MAIL OR FAX ORDERS TO:
(714) 448-7750 • FAX: (714) 448-7760
Compuserve Address: 75151,2421
First Source International
7 Journey • Aliso Viejo, California 92656

HOURS
Monday - Friday • 7am - 5pm, PST
Saturday, 9am - 3pm (orders only)

YOUR FIRST SOURCE FOR MEMORY UPGRADES!

WHY FSI?

Since 1990 First Source International has sold over 1,000,000 memory products! Thanks for making First Source your only source for memory upgrades!

LASER PRINTER MEMORY

- Canon LBP-4
  - 1MB n/a ..... $109 2MB n/a $159
- Canon LBP-8II, IIR, IIT
  - 2MB S64-1880 ..... $119
- Epson ActionLaser 1000, 1500
  - 512K n/a ..... $35 2MB n/a $99
- Epson ActionLaser 1100
  - 2MB n/a ..... $99 4MB n/a $159
- Epson ActionLaser 1600
  - 4MB n/a ..... $159 16MB n/a $609
- HP Laserjet 4L
  - 1MB C2024A $48
- HP Laserjet IIP, III, IIIP, IIID
  - 2MB 33477B ..... $95 4MB 33477B $169
- HP Laserjet II, IID
  - 2MB 33448B ..... $95 4MB 33445B $169
- HP Laserjet IIISi, 4, 4M, 4Si, 4SiMX, XL300, Deskjet 1200C
  - 1MB C2063A ..... $48 2MB C2064A $89
  - 4MB C2065A ..... $169 8MB C2066A $439
- HP Laserjet 4P, 4MP, Color Laserjet
  - 2MB C3131A ..... $95 4MB C3132A $179
- HP Deskjet 500, 500C, 520, 520C, 550C, 560, 560C
  - 256K 2270B $40
- HP Designjet 650c Inkjet Plotter
  - 16MB D2297A $549
- IBM/Lexmark Laser 4019 (all models)
  - 2MB 1049676 ..... $107 4 5MB 1049147 ..... $167
- IBM/Lexmark Laser 4029 (all models)
  - 2MB 1183344 ..... $87 4MB 1183345 ..... $157
- IBM/Lexmark Laser 4039, 4079 (all models)
  - 4MB 1329363 ..... $157 8MB 1329365 ..... $319
- OkiLaser 400
  - 1MB 70014701 ..... $69 2MB n/a $97
- OkiLaser 400e, 410e
  - 2MB n/a ..... $117 4MB n/a $197
- OkiLaser 840, 840 Plus, 840
  - 2MB n/a ..... $124 4MB n/a $209
- Panasonic LaserPartner 4400, 5400
  - 2MB KX-PEM1 ..... $110 4MB KX-PEM2 ..... $204
- Panasonic LaserPartner 4410, 4420
  - 2MB KX-P441 ..... $115 4MB n/a $196
- Panasonic LaserPartner 4450, 4420
  - 2MB KX-P4411 ..... $116 4MB n/a $187
- Texas Instruments MicroLaser, XL
  - 1MB 2555739-0001 ..... $49

PERSONAL COMPUTER MEMORY

AST

- Premmia GX P/100, P/90
  - 8MB 501565-001 $309 16MB 501566-001 $609
  - 32MB 501567-001 $1,007 64MB 501568-001 $1,999
- Premmia MTE, SE P/60
  - 4MB 501159-001 $190 8MB 501159-002 $357
  - 16MB 501159-003 $712 32MB 501159-004 $1220
- Bravo 386-SX, WS/286, 386
  - 2MB 500510-002 $88 4MB 500510-008 $195
- Bravo 3/25s
  - 2MB 500710-004 $89 8MB 500824-002 $306
- Advantage! Plus 486DX/33, DX2-50, DX2-66
  - 4MB 501168-001 $158 8MB 500824-001 $329
- Advantage! and Advantage! Pro 386SX/20, 25, Bravo 3/33s
  - 2MB 500962-001 ..... $80
  - 8MB 500962-002 ..... $272
- Advantage! Pro 486DX/33, SX/25
- Bravo LC, LC II, LP and MT
  - 2MB 500987-001 ..... $86
  - 4MB 500987-002 ..... $151
  - 16MB 500987-004 ..... $518
  - 32MB 500987-005 ..... $1099
- Premium 386/25, 33, 33T and Premium II 386SX/16, 20, 25
  - 1MB 500780-003, 002 ..... $45
- Premium 386/33T, 386SX/16 and Premium II 386SX/20, 25
  - 4MB 500780-004 ..... $188
- Advantage! 486/25, 33, 33p, SX20, Premium Server SE 4/33
- Power Premium and Premium TE all models
- Premium II 386/25, 33, 486/33, 486SX/20
  - 8MB 500780-001 ..... $298

COMPAQ

- Presario 500, 700 and 900 series
  - 4MB 147522-001 ..$159 8MB 147523-001 $307
  - 16MB 147524-001 $549 32MB 147525-001 $1019
- ProLiant 2000 and 4000 series, Systempro XL
  - 16MB 149949-001 $709 32MB 149912-001 $1426
  - 64MB 149913-001 $2436 128M 149914-001 $4595
- ProLinea 3/25s, 3/25zs
  - 2MB 141738-001 ..... $89
  - 8MB 141742-001 ..... $304
- Presario 600 and 800 series, ProLinea 4/25, 4/33, 4/50, 4/66
- ProLinea MT and ProLinea Enhanced series, ProSignia VS
  - 2MB 141683-001 ..... $95
  - 4MB 141684-001 ..... $153
  - 8MB 141685-001 ..... $307
- DeskPro 386-20, 25, 386-20e, 25e
  - 1MB Module 113131-001 ..... $62
  - 4MB Module 113132-001 ..... $167
- DeskPro 386s/16
  - 1MB Module 113646-001 ..... $62
  - 4MB Module 112544-001 ..... $194
  - 4MB Board 113634-001 ..... $287
- DeskPro 3/25i, 33i, 4/25iS, 33i; 66i, 286N; 386N, SX/20; 20N, SystemPro LT and M Series
  - 1MB 118688-001 ..$49 2MB 118689-001 ..$95
  - 4MB 118690-001 ..$153 8MB 118877-001 ..$356
- ProSignia PC Server 486/33, DX2/66
  - 16MB 149320-001 $610 32MB 149147-001 $1152
- DeskPro 386-33, 486-33, SystemPro and SystemPro E series
  - 2MB 115144-001 $109 8MB 116561-001 $376

STANDARD SIMMS UPGRADES

30-PIN

- 1 x 3-70ns (3-chip/1MB) ..$35.50
- 1 x 9-70ns (1MB) $37
- 4 x 9-70ns (4MB) $126
- 16 x 9-70ns (16MB) $565

72-PIN

- 512 x 36-70ns (2MB) $92
- 1 x 36-70ns (4MB) $140
- 2 x 36-70ns (8MB) $292
- 4 x 36-70ns (16MB) $519

First Source International Always Includes Installation Instructions!

ALWAYS CALL FSI BEFORE YOU BUY!

DELL

- Optiplex ME and A models, PowerEdge XE models
- Performance L, M and T models
  - 4MB 310-3525 ..$151 16MB 310-3527 ..$525
- Power Desktop and Low Profile Power Desktop models
  - 1MB 310-2505 ..... $49
  - 4MB 310-2507 ..... $151
  - 16MB 310-2625 ..... $575
- PowerLine Workstation DE and SE models
  - 2MB 310-2466 ..$49 4MB 310-2467 ..$190
  - 8MB 310-2468 ..$405 16MB 310-2469 ..$712
- Performance ME models
  - 8MB 310-3335 ..$305 32MB 310-4337 ..$1220

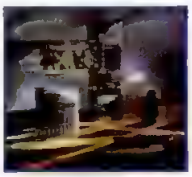
HEWLETT-PACKARD

- Vectra VL2, XP, XP, M2, N2 and XM2 models
- Netserver LM, LC and LF models
  - 4MB D2974A ..$179 8MB D2975A ..$356
  - 16MB D2229A ..$609 32MB D2298A ..$1152
- Vectra QS and RS models
  - 4MB D1542 or D6424 ..$177
- Vectra 386/16N, 20N, 25N models
  - 2MB D2406A ..$99 8MB D2404A ..$305
- Vectra 486 M, MI, N, NI and XM models
  - 2MB D2381A ..$95 8MB D2152A ..$305
  - 4MB D2156A ..$151 16MB D2676A ..$611
- Vectra 386/25, 386/25T, 33T, 33ST, 50T, 66T and 66ST
  - 2MB D2381A ..$95 8MB D2152A ..$357
- Vectra 386/33N, NI models
  - 2MB D2714A ..$92 8MB D2716A ..$304

IBM

- Aptiva 300, 500 and 700 series
  - 4MB n/a ..... $159 16MB n/a $509
- Eduquest 55
  - 4MB 76G1299 ..... $174
- Eduquest 30, 40 and 50 models
  - 4MB 60G0896 ..$174 16MB 60G0898 ..$549
- PS/1 286, 386SX
  - 2MB 92F9935 ..$83 4MB 92F9694 ..$163
- Valuepoint Performance models
  - 4MB 92G9201 or 76G3141 ..... $179
  - 8MB 92G7520 or 76G3142 ..... $354
- PS/1 Consultant, Essential, Expert models 1x43, 1x44, PS/Valuepoint all models except Cxx models
  - 4MB 96F9290 ..$177 16MB 96F9291 ..$609
- PS/1 Consultant, Essential, Expert models
  - 16MB 96F9291 ..... $609
- PS/2 25/286, 30/286
  - 2MB 30F5360 ..... $79
- PS/2 35SX, LS, 40SX, 50Z, 55SX, LS, 65SX, LS, 70, XStation
  - 2MB 64S0604 ..... $87
- PS/2 70-A21, A61, B21, B61, PS/Valuepoint Cxx models
- PS/1 Consultant, Essential, Expert models
  - 2MB 64S0608 ..... $95
- PS/2 35SX, LS, 40SX, 55SX, LS, 65SX, LS, XStation, PS/Valuepoint Cxx models
  - 4MB 34F2933 or 87F9977 ..... $179

The inside name in upgrades



Kingston Technology Corporation

IBM, Continued

- PS/2 35SX, LS, 40SX, PS/Valuepoint
  - 8MB 64S0129 ..... $356
- PS/2 90 XP, 95 XP, P75 (pairs) S6, S7 (all) PS/1 Pro M2123
  - 2MB 64S0902 ..... $85
- PS/2 90 XP, 95 XP, P75 (pairs) S6, S7 (all models)
- PS/1 Consultant, Essential, Expert models, PS/1 Pro M2123
  - 4MB 64S0128 ..... $169 8MB 64S0130 ..... $356
- PS/2 80-111, 311, 121, 321, 081, 161
  - 2MB 64S0379 ..... $88
- PS/2 80-A21, A31, A16
  - 4MB 64S1060 ..... $193
- Expansion boards for PS/2 80-286 based models
  - +16MB w/4MB 64S0609 (use 72-pin) $299
- Expansion boards for PS/2 80-386 based models
  - 2-14MB w/2MB 34F3077 (use 72-pin) $205
  - +16MB w/4MB 34F3011 (use 72-pin) $299

NEC

- Image 425, 433, 466
  - 4MB 410-12002 $147 16MB 410-12003 ..$556
- Ready 425, 433
  - 4MB n/a ..... $147 16MB n/a $556
- PowerMate 386/33i, Express Te, e models
  - 4MB OP410-6205 $176 16MB OP410-6206 ..$610
- PowerMate 286/12, SX/16, SX/20
  - 2MB OP-410-8103 ..... $89
- PowerMate 386SX/20i, vi, 16i, 25i, 486/50i, 33i
  - 8MB OP-410-2101 ..... $304
- PowerMate SX Plus
  - 2MB Board n/a $163
  - 4MB Board n/a $278
- PowerMate SX/20
  - 2MB CPU Upgrade OP-410-8101 ..... $151
  - 2MB Board OP-410-8102+8103 ..... $171
- PowerMate 386V/20, 25
  - 2MB APC H655 $219 8MB APC-H656 ..$559
- PowerMate 386/33E, 486/25E
  - 2MB OP-410-5101 ..... $171

ZENITH

- Z-400+, Z-Station SEh, SEn, Sh, Sn, DEh, Dh and Xen Z-400/400 Series, Z-420/SX, Z-425SX, Z-433/DX, SX
  - 4MB ME-100 ..... $179
  - 16MB ME-90 ..... $610
- Z-Station models
  - 1MB ME-70 ..... $49
  - 4MB ME-100 ..... $179
- Z-Select 100 models
  - 4MB AME-0070 ..$179 8MB AME-0073 ..$354
- Zenith Z-386/20, 25, 33, 33E
  - 1MB ZA3800ME $49
  - 4MB ZA3800MK $179
- Zenith Z-386SX/16 and Z-386SX/20
  - 2MB Z-605-1 ..... $89
- Z-Server EX and LT models
  - 8MB ME-432 ..... $359
  - 16MB ME-102 ..... $610
  - 32MB ME-412 ..... $1220
  - 64MB ME-92 ..... $2439
- Zenith 486/33ET
  - 4MB ZA4200-M2 ..$190 16MB ZA4200-M8 ..$713

FOR MEMORY, ALL YOU NEED TO KNOW IS THE NAME OF YOUR PC!

$6 FedEx Economy Two-Day Service Up to 3lbs. FedEx Federal Express

Our upgrade experts have detailed configuration information on thousands of computers and printers, from the oldest to the latest models. We provide you with an "Easy Upgrade" by providing you with the following information:

- ✔ Your System Memory Features
- ✔ How Much Memory You Really Need
- ✔ Memory Products Available for Your System
- ✔ The Most Cost Effective Upgrade Path for Your System
- ✔ Your Systems Minimum and Maximum Memory Capabilities

First Source International takes the confusion out of your memory purchase. Take advantage of our service and the savings!

LAPTOP AND NOTEBOOK MEMORY

AST

Ascentia 800n, 810n	4MB	$185
	8MB	$359
Ascentia 900n, 910n	4MB	$205
	8MB	$359
Bravo NB 486	4MB	$169
	16MB	$599
PowerExec 4/25SL, Color, Plus	4MB	$185
	16MB	$629
PowerExec 5/25SL, 5/25SL-C, EL	4MB	$149
	16MB	$629
Premium Exec 386SX/20, 25, 25C	4MB	$160

COMPAQ

Contura Aero 4/25, 4/33c	4MB	$179
	8MB	$299
Concerto 4/25, 4/33	4MB	$175
	8MB	$365
Contura 3/20, 3/25, 3/25c	4MB	$149
	8MB	$298
Contura 400 models	4MB	$180
	8MB	$365
Contura 4/25, 4/25cx, 4/25c	4MB	$169
	8MB	$298
LTE Elite	4MB	$174
	8MB	$315
	16MB	$598
LTE Lite 20, 25, 25c, 25e	4MB	$200
	8MB	$349
	16MB	$729
LTE Lite 4/25c	4MB	$180
	8MB	$339

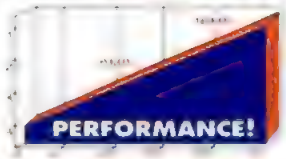
Everex

Tempo LX Notebook	2MB	$89
STEP Note 486SX/33, 50, 75	16MB	$699

IBM

ThinkPad 220	4MB	$238
ThinkPad 230Cs	8MB	$409
ThinkPad 300	8MB	$339
ThinkPad 340, 355, 360, 730	4MB	$169
	8MB	$309
	16MB	$651
ThinkPad 510	4MB	$199
	8MB	$359
ThinkPad 700, 720, 755 and CL/575X	4MB	$199
	8MB	$379
	16MB	$669
	32MB	$1399
ThinkPad 710T	4MB	$179
	8MB	$315
N51 Notebook	2MB	$95
	4MB	$179
L40SX, N33SX, PS/Note 182	4MB	$146
	8MB	$288

WHY ADD MORE MEMORY?



Most applications run satisfactorily with 8MB, but in the long run 16MB is recommended

- Memory allows Windows & OS/2 to run faster
- Reduces your system's need to access the hard disk
- Utilizes numerous & extensive applications at the same time

NEC

Versa S	4MB	$199
	8MB	$319
UltraLite Versa (E, V, 16, P)	4MB	$189
	8MB	$349
	16MB (3.3 V)	$619
UltraLite III, SL/25C	2MB	$85
	6MB	$529
	8MB	$340
UltraLite SL/20, SL/20P	2MB	$85
	6MB	$279
ProSpeed 286, 386SX/16	4MB	$179

Texas Instruments

TravelMate 3000 (all models)	2MB	$79
TravelMate 4000 (all models)	4MB	$189
	16MB	$959
TravelMate 4000M	4MB	$198
	16MB	$799

Toshiba

T2000, 2000SX, SXe	4MB	$167
T2200SX, T1800 Series	8MB	$317
T2400, T2450	4MB	$184
	8MB	$354
T1200XE, 1600, 5100E	2MB	$89
T3100SX, 3200SX, SXC	2MB	$115
	4MB	$147
T3300SL	4MB	$165
	8MB	$309
T3400, T3600	4MB	$185
	8MB	$349
T4400, T6400 (all models)	4MB	$179
	8MB	$339
	16MB	$675
T1900, T4500, T4600,	4MB (3.3 V)	$188
T4700, T4850, T4800, T4900	8MB (3.3 V)	$349
	16MB (3.3 V)	$719
T5400, T5200, T5200C, T8500	2MB	$87
	8MB	$347

Zenith

Z-Note 320L, 320Lb, 325L, 325Lc	2MB	$95
	8MB	$298
Z-Note 425 Series	4MB (3.3 V)	$155
	8MB (3.3 V)	$369
Z-Sport 4205, 425S	4MB	$189
Z-Sport 325S	4MB	$189
MastersPort 386SL, SLC, SLe	2MB	$85
MastersPort 386SX	2MB	$85
SuperPort SX, 286e, SlimsPort	2MB	$139
Z-Star	4MB	$159
	8MB	$369

MONEY BACK 30 DAY Guarantee

100% GUARANTEED
Memory Guaranteed - 100% Compatible in form, fit & function

LIFETIME WARRANTY
On all Paragon Memory products

EASY TO INSTALL
All products user installable, installation instructions included with most memory products

FREE SUPPORT
Free technical support & direct dial lines for immediate response

SPECIAL PRICING
Government & educational pricing, special volume pricing

PLUS . . .
Overnight delivery available
No surcharge on credit cards
Corporate PO's, APO/FPO's welcome

FIRST SOURCE OFFERS OVER 20,000 NAME BRAND HARDWARE & SOFTWARE PRODUCTS AT DISCOUNT PRICES!

CD-ROM DRIVES

2X DRIVES

NEC
Multispin 2Vi, Internal, 320ms, 300kb, IDE with controller $375
Media Vision
Reno MV 400, External, 180ms, 350kb, SCSI, with controller $289

4X DRIVES

Toshiba
XM-6401B-S 4X, Internal, 190ms, 600kb, SCSI, without controller $515
XM-3601A-S 4X, External, 190ms, 600kb, SCSI, without controller $599
Plextor
4PLEX, Internal, 190ms, 600kb, SCSI, 256kb buffer, without controller $529
4PLEX, External, 190ms, 600kb, SCSI, 1MB buffer, without controller $694
NEC
Multispin 4Xi, Internal, 220ms, 600kb, SCSI, without controller $502
Multispin 4Xe, External, 220ms, 600kb, SCSI, without controller $490

REMOVABLE DRIVES

- Provides unlimited storage capacity
- Performs up to 3 times faster than tape
- Organizes data easily and allows easy data transportability
- Provides data security

Internal IDE Drive 270MB, 13.5ms, 3.5" $394
External SCSI Drives
88MB, 20ms, 5.25" $285
200MB, 19ms, 5.25" $415
270MB, 13ms, 3.5" $415
Cartridges
88MB $54 200MB $79 270MB $64

PROCESSORS UPGRADES

386 TO 486 PROCESSOR UPGRADES

The Answer to High Performance, Compatible & Economical 386 Upgradability!

- On-chip 1-KByte Data Cache
- Cache Coherency
- 2X Clock Multiplier
- Single Chip Form Factor
- Clock Duty Cycle Correction
- Single-Cycle Execution
- Low-Cost Floating-Point Option

Cyrix

Cx486Dlc2-25/50 ..... $199
Cx486Slc2-25/50 ..... $199
Cx486Dlc2-33/66 ..... $258

$10 INSTANT REBATE when purchased with a 4MB memory upgrade

INTEL OVERDRIVE™ PROCESSOR

CPU upgrade that significantly accelerates software applications on existing systems.

- A single chip that dramatically increases the speed of your system's processor
- Significantly boost overall system performance of your PC
- Boost your software's speed in any PC operating system: Windows™ MS-DOS, OS/2, and UNIX

intel

OverDrive™ 486SX2-50 ..... $319
OverDrive™ 486DX2-66 ..... $385
OverDrive™ 486SX-75 ..... $329
OverDrive™ 486DX4-100 ..... $399
OverDrive™ Pentium, 63MHz $399

FAX • MODEMS

US Robotics

Sportster 14.4 PCMCIA $179
Sportster 28.8 V.34 PCMCIA $349
Sportster 14,400 FAX, Int./Ext. $185/$215
Sportster 28.8 V.34, Int./Ext. $225/$242

Megahertz — GREAT VALUE!

XJ1144 14,400bps FAX/Modem $369
XJ1144 14,400bps FAX/Modem XJ1144/Gold XJ2144 ..... $179/$205
14,400bps FAX/Modem w/ direct connection to selective cellular phones $389
14,400bps FAX/Modem + Modem $417

VIDEO CARDS

Fire up to 64-bits!

GX264 1MB PCI, VLB	$379
GX264 2MB PCI, VLB	$397
GX264+ Pro 2MB PCI, VLB	$553
GX264 Pro 4MB PCI, VLB	$529
Graphics Xpression 2MB, 70Hz, ISA, VLB or PCI	$211
WinTurbo 2MB, 100Hz, ISA, VLB or PCI	$295
Graphics Pro Turbo 2MB, 90Hz, ISA, VLB or PCI	$376
1MB, 72Hz, VLB/PCI VRAM, w/Corel 3.0	$150
2MB, 90Hz, VLB/PCI VRAM, w/Corel 3.0	$202
Stealth 64 2MB, 120Hz, VLB/PCI VRAM, w/Corel 3.0	$333
Stealth 64 4MB, 120Hz, VLB/PCI VRAM, w/Corel 3.0	$524
SpeedStar 64 1MB, 72Hz, ISA/PCI	$150
SpeedStar 64 2MB, 72Hz, ISA/PCI	$202

OVER 5,000 SOFTWARE TITLES AVAILABLE

MAIL OR FAX ORDERS TO:
(714) 448-7750 • FAX: (714) 448-7760
Compuserve Address: 75151,2421
First Source International
7 Journey • Aliso Viejo, California 92656

HOURS
Monday - Friday • 7am - 5pm, PST
Saturday • 9am - 3pm (orders only)

Call the Upgrade Experts

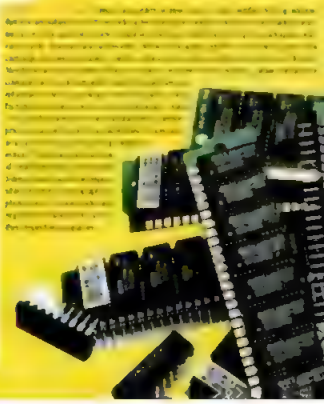
ORDER NOW

800-298-9866

International Orders Call 714-448-7750

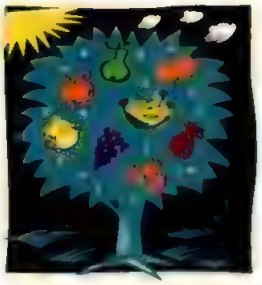
CALL NOW FOR YOUR FREE CATALOG!

First Source International



CIRCLE 014 ON READER SERVICE CARD

MPC Introduc Concept In



"MPC CD-BOOKs are the closest we've come to real desktop replacements. They are the first true, self-contained portable multimedia machines"

— PC Magazine, Dec. 6, '94

"While the unit (MPC CD-BOOK) uses a DX4-75 processor, its performance was in the same league as the 100 MHz IBM and Panasonic machines in our Winstone 95 tests."

— PC Magazine, Dec. 6, '94

"Notebook computer design and multimedia features mesh nicely in the CD-BOOK 800 series from MPC Technologies, Inc."

— Computer Shopper, Feb. '95

"The full-sized, top-loading CD-ROM drive on MPC's CD-BOOK 800 performs as well as or better than CD-ROM drives designed for desktop systems."

—PC Computing, Jan. '95

"The MPC CD-BOOK™ 800 is a well designed, relatively low-cost multimedia notebook from MPC. At 6.8 pounds, the CD-BOOK 800 is a very compact and lightweight package that also features a colorful industrial design."

—Mobile Office, Feb. '95

"While other leaders in the notebook field plan similar CD-ROM systems, MPC's CD-BOOK is the first one to give the traveling executive an integrated multimedia notebook."

— PC Magazine, Nov. 22, '94

"The MPC CD-BOOK 800 is a fine multimedia notebook at a great price."

— Mobile Office, Feb. '95

"While Panasonic's CF-V21P boasts a built-in 3.5-inch CD-ROM drive, the CD-BOOK is the first to include an industry-standard, double-speed, 5.25-inch CD-ROM drive, which means users can access the more than 10,000 CD-ROM titles available."

— PC LapTop, Dec. '94

"MPC's CD-BOOK is the lightest multimedia system we've seen."

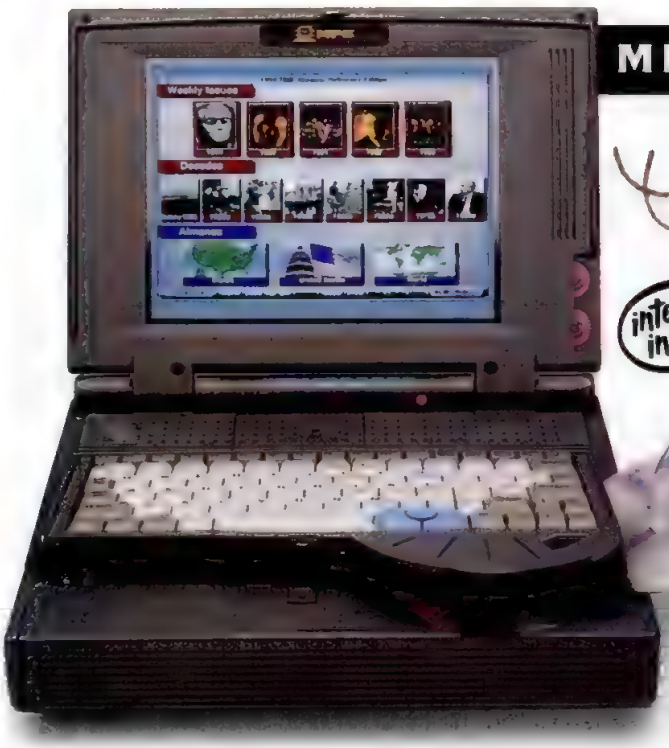
— PC Computing, Jan. '95

"The MPC CD-BOOK makes portable multimedia affordable."

— PC Magazine, Dec. 26, '94

"MPC is among the first companies to sell a laptop with an internal, standard-format, double-speed CD-ROM drive. The early production unit we tested proved to be well-suited for most everyday multimedia applications, including animation, full-motion video, games, and audio-CD listening"

— Computer Shopper, Feb. '95



MPC CD-BOOK™

$2400

DX4-75
DUAL SCAN
4MB/260MB HDD
AND 5.25" CD ROM

d-Time

intel inside

PRE-LOADED ACCELERATOR SOFTWARE NOW INCLUDED WITH EVERY MPC 800 CD-BOOK COMPUTER. MAKES YOUR CD-ROM AS FAST AS A 4X OR 8X CD-ROM

UPGRADEABLE CPU LETS YOU EXPAND YOUR COMPUTING POWER AS YOUR PERFORMANCE NEEDS CHANGE

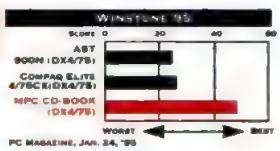
THE COMPLETE MULTIMEDIA COLOR PORTABLE COMPUTER INCLUDES: BUILT-IN 5.25" CD ROM, BUILT-IN 16-BIT STEREO SOUND CARD (SOUND BLASTER PRO COMPATIBLE), BUILT-IN STEREO SPEAKERS AND AUDIO LINE IN, PCMCIA III SLOT, FREE 12-CD PACK

MPC CD-BOOK vs. PANASONIC V41

	MPC CD-BOOK	PANASONIC V41
WINDOWS APPLICATIONS	GOOD	GOOD
DOS APPLICATIONS	GOOD	GOOD
ROAD WARRIOR	GOOD	FAIR
DESKTOP REPLACEMENT	GOOD	GOOD
TFT 100 MHz, 8MB RAM, 480MB HDD	$3818	$6480

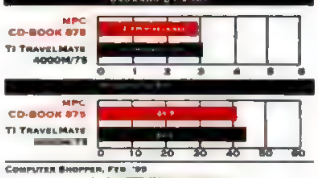
PC MAGAZINE, JAN. 24, '95

WINSTONE '95



PC MAGAZINE, JAN. 24, '95

MPC CD-BOOK 875



COMPUTER SHOPPER, FEB. '95

COMPUTER SHOPPER

800 SERIES SPECIFICATIONS

- DX2-50, DX2-66, DX4-75 or 100 MHz
- Built-in double speed CD ROM supports 5.25" CDs
- 12 free CD titles
- 4MB expandable to 12MB
- 9.5" Dual Scan & TFT Active LCD screen
- VGA port support 1024x768x256 color
- Accelerated 32-bit VESA Local Bus VGA with 1MB
- Built-in pointing device (Versa Point)
- PCMCIA Type III slot
- 16-bit stereo (Sound Blaster compatible)
- NiMH battery
- Advanced power management
- Built-in microphone & stereo speakers
- I/O: parallel, serial, VGA & audio in/out
- DOS & Windows for Work Group
- Carrying case
- 6.6 lbs. (DS) with battery
- Cigarette lighter adapter

FREE CD TITLES (A $459.00 VALUE) INCLUDE:

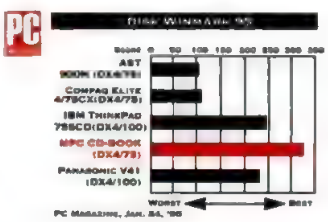
WINSTONE '95

PC MAGAZINE, JAN. 24, '95

DOSMARK

PC MAGAZINE, JAN. 24, '95

DISK WINMARK '95



PC MAGAZINE, JAN. 24, '95

Terms: No surcharge for MasterCard or Visa orders. Credit card purchases subject to service charge. Purchase orders accepted from approved corporations, government institutions and universities. 30-day money back guarantee, not including shipping. All trademarks and registered trademarks are of their respective holders, Inc. There are no returns for credit after 30 days. All returns must be shipped in original packaging. Shipping, handling and opened software are non-refundable during and after 30-day money back guarantee period.

ES THE FIRST ALL-IN-ONE NOTEBOOK COMPUTING.

MPC 700 TOUCHNOTE™

intel inside

$2199

DX4-75 DUAL SCAN, 8MB RAM, 260MB HDD

3 VOLTS

3-VOLT DESIGN
MEANS LESS POWER CONSUMPTION, PROVIDING MORE OPERATING TIME, LESS HEAT AND GREATER RELIABILITY.

PCMCIA IV SLOT
WHILE OUR COMPETITORS INCLUDE ONE PCMCIA TYPE III SLOT, WE GIVE YOU A TYPE III PLUS AN EXTRA TYPE II SLOT, ALLOWING YOU INSTANT FAX, MODEM, NETWORKING AND OTHER CAPABILITIES.

NEW TOUCH PAD!
ERGONOMIC POINTING DEVICE USING AWARD-WINNING GLIDEPOINT TECHNOLOGY IS DESIGNED FOR LONG TERM COMFORT

GLIDEPOINT® TECHNOLOGY

LCD STATUS INDICATOR
A CONVENIENT LCD DISPLAY MONITORS KEY FUNCTIONS SUCH AS BATTERY LIFE, HDD USE AND POWER MANAGEMENT

MPC TOUCHNOTE™ IS THE FIRST MS-DOS COMPATIBLE TOUCH PAD NOTEBOOK COMPUTER AVAILABLE ON THE MARKET.*

MPC Technologies, Inc. makes portable computers even more affordable. Now we are introducing the All-In-One Concept.

As industry reviews and test results show, MPC delivers the best feature-for-feature value in notebook solutions today. Call today and let one of our skilled sales consultants help you determine which MPC System is best for you.

DUAL SCAN 100MHZ, 8MB RAM, 352MB HDD	$2,350
DUAL SCAN 100MHZ, 8MB RAM, 524MB HDD	$2,475
TFT ACTIVE MATRIX 100MHZ, 8MB RAM, 524MB HDD	$3,255

DUAL SCAN 100MHZ, 8MB RAM, 524MB HDD	$2,760
TFT ACTIVE MATRIX 100MHZ, 8MB RAM, 524MB HDD	$3,815

Above configurations are for immediate delivery. For other configurations or Trackball pointing device please consult with MPC's sales department.

TDK PCMCIA 28.8 FAX/MODEM (CELLULAR-READY!)	$379	MPC PCMCIA EXT. CD-ROM DRIVE	$235
		TARGUS LEATHER CARRYING CASE	$ 95
		MPC 4MB RAM CARD UPGRADE	$185
TDK PCMCIA 14.4 FAX/MODEM	$189	MPC 8MB RAM CARD UPGRADE	$399
D-LINK PCMCIA ETHERNET 2 IN 1	$129	MPC 16MB RAM CARD UPGRADE	CALL!

Prices are subject to change without notice or obligation. Above prices are for MPC customers only. This offer is valid within 30 days of notebook computer purchase only.

700 SERIES SPECIFICATIONS

- DX2-50, DX2-66, DX4-75 or 100 MHz
- 8MB RAM, max. 32MB, EMS 4.0 support
- 3.5" 1.44MB FDD
- Slide-out HDD: 260MB up to 800MB
- 9.5" or optional 10.4" color dual scan STN LCD
- 1MB Video Local bus
- VGA port support 1024x768x256 color
- New PCMCIA IV slots, support 1 type II & 1 type III
- Built-in Touch Pad or 19mm extra-large centertrack ball
- Built-in 16-bit stereo Sound Blaster compatible
- True 3.3 Volt system
- Advanced SMI power management
- System status panel
- Upgradeable LCD screen
- NiMH battery w/hot swapping features
- I/O: parallel, serial, VGA, audio in/out, docking connector
- Built-in microphone & stereo output
- MS-DOS & Windows for Work Group
- 5.7 lbs. including battery pack

MPC TECHNOLOGIES, 2915 DAIMLER ST., SANTA ANA, CA 92705. LOCAL: (714) 724-9000. (800) MPC-8088. FAX: (714) 724-9648. BBS: (714) 724-1519/724-1543. TECH SUPPORT: (800) 672-6686. 24-HOUR FAX/BACK: (800) 672-8882. CUSTOMER SERVICE: (800) 672-9929

MPC

1-800-672-8088

SALES DEPARTMENT OPENS EVERY DAY EXCEPT HOLIDAYS
MON.-FRI. 6:30AM-6PM PST,
SAT.-SUN. 9AM-3PM PST

VISA MasterCard

respective companies. All prices & configurations subject to change without notice or obligation. CD-BOOK™ is a licensed trademark of MPC Technologies, Inc. MPC Technologies is not responsible for any advertisement errors. All repair or replacement of defective parts is at the discretion of MPC.

CIRCLE 177 ON READER SERVICE CARD

WE WILL TRY TO MATCH OR BEAT ANY ADVERTISED PRICE. CALL FOR LATEST PRICING!!

WE ACCEPT PO'S
FROM QUALIFIED FIRMS

M E M O R Y

SECURITY WILL CALL WINDOW NOW OPEN!
NO SURCHARGE FOR MC, VISA AE & DISCOVER

CACHE MEMORY

	128KB	256KB	256KB	512KB
8Kx8	-	6.50	8.00	8.50
32Kx8	19.00	9.00	8.00	7.00
32Kx8 (3.3V)	-	-	14.50	-
64Kx1	-	11.00	9.00	8.00
64Kx4	-	11.00	9.00	8.00
16Kx4	-	8.00	7.00	6.00
128Kx8	-	56.00	39.00	29.00

Individual D-RAM Chips

MEMORY FOR 486 & APPLE

	256K	1MEG	4MEG	16MEG
1Meg/1	-	6.00	5.00	4.00
1Meg/4	-	40.00	30.00	35.00
1Meg/4 Zip Pkg	-	34.00	22.00	21.00
256x4 Page Pkg	-	7.25	6.75	6.50
256 x 4 Static Pkg	-	-	12.00	-
256x4 Page Zip	-	7.25	6.00	-
256x4 Video Zip	-	-	12.00	11.00
256x4/SCAK	-	29.00	24.00	-
256 x1	-	3.25	2.75	2.25
64x4	-	-	3.75	-
64x1	-	-	-	3.00
256x16 SO J	-	-	-	-
256x16 Video Zip	-	46.00	36.00	-

INTEL Math Chips

80387	39.00
80387 2	45.00
80387 1	79.00
80287 XL	49.00
80387-16 DX	39.00
80387-20 DX	44.00
80387 DX (Does All)	74.00
80487-SX (Does All)	229.00
Intel SX (Does All)	69.00
Intel SX Model	69.00
Intel 168X	39.00
Intel 208X	49.00

Lowest prices on Intel overdrive chips

AMBRA

Ambra Pentium-60	4/8/16 Meg
Ambra MC 425SL	2/4/8 Meg
Ambra N Series	4/8/12/16 Meg
Ambra SN Series	4/16 Meg
Ambra Sprinta SLC n	2/8 Meg
Ambra N-5 N 100	4/8/16

CYRIX DRx² 386 to 486 Upgrade
Clock Doubler

- Simple chip upgrade solution
- Clock doubling technology
- Compatible with industry standard 386SX CPU socket
- Compatible with DOS, Windows, 3.X, OS/2 1.3 and 2.x
- Uses industry standard math chip
- Easy to install - about 15 minutes

CX486 DRx² 25/50	229.00
CX486 DRx²-33/66	279.00
CX486 SRX2 25/50	229.00

DIMM MODULES

4Meg 8Meg 16Meg 194 304 799

SIMM MODULES (Add $5.00 for SIPP)

	4MB	8MB	16MB	32MB	64MB
256 x 9	-	-	10.00	9.00	8.00
1Meg x 9 (3 chip)	-	46.00	42.00	40.00	-
1Meg x 9 (9 chip)	-	49.00	46.00	43.00	41.00
4Meg x 9	-	-	154.00	149.00	139.00
16Meg x 9 (9 chip)	-	-	-	569.00	-

72 PIN SIMMS (EISA)

256 x 36 1 mg	-	-	-	69.00	59.00	-
512 x 36 2 mg	-	-	-	99.00	79.00	-
1 mg x 36 4 mg	-	-	189.00	179.00	179.00	-
2 x 36 8 mg	-	-	379.00	364.00	364.00	-
4 x 36 16 mg	-	-	749.00	549.00	549.00	-
8 x 36 32 mg	-	-	1149.00	1149.00	1149.00	-
16 x 36 64 mg	-	-	2799.00	2745.00	2745.00	-
1 x 32 4 mg	-	-	169.00	164.00	164.00	-
2 x 32 8 mg	-	-	349.00	329.00	329.00	-
4 x 32 16 mg	-	-	499.00	479.00	479.00	-
72 Bit & 64 Bit Simms	Call	Call	Call	Call	Call	Call

CYRIX FASMATH PROCESSOR

Prog ams executed up to 3X faster • Plug & direct code compat. in/out

83D87 40MHz 79.00 | 83D87 33MHz 49.00 | 83S87 25SX Ver 49.00
83D87-33SX - 85.00 | PC Week™ rated #1 over all math chips

5 Year Warranty • "All Downward Compatible"

AST MEMORY

MODEL	AMT. UPGRADED		PRICE
Bravo LC Series, Bravo MT, Bravo MS, Bravo LC Advantage Pro EISA Series	4Meg	72 pin SIMM	189.00
	8Meg		339.00
	16Meg		679.00
	32Meg		1354.00
	64 Meg		2709.00
Premmia LX P90 MS4/66d 4/16/1F P90	8 Meg		339.00
	16 Meg		679.00
	32 Meg		1354.00
	64 Meg		Call
Premmia 4133, 4135S, 4/50d, 4/66d	8 Meg		339.00
Premmia SE 4/33, 4/66d P/60	16 Meg		679.00
Premmia MT1 4/33, 4/66d P/60	32 Meg		1354.00
Manhattan 4/33, 4/50d, 4/66d	64 Meg		2709.00
Power Premier 3/33, 4/33, 4/33S, 4/50d, 4/66d	8Meg		379.00
Premium 486/25, 486/25S, 486/33, 486/33S			
Premium 386/33, 486/25TE, 486/33TE			
Prism 386/25, 386/33, 486/33, 486 SX/20			
Bravo 486/25, 486/33	2 Meg Kit	64 pin SIMM	119.00
Advantage 486/25, 486/33, 486/33P, 486 SX/20	8Meg Kit		379.00
Premium SE 4/33	16Meg Kit		759.00
Premium SE 4/33, 4/66d P/60	32Meg Kit		1519.00
Prism 386/33T, 386 SE/16, Prism II 386SX/20, 386/25	4Meg		189.00
Premmia GX P/60, P/100	8Meg Kit/4Meg Kit		379.00
	32Meg Kit/16Meg Kit		1519.00
AST Super Board	1/2 Meg		119.00

ZENITH MEMORY MODULES

MODEL	AMT. UPGRADED	AST PART #	PRICE
Z386/33 25 20 33E	1Meg	ZA3800ME	59.00
Z386/33 25 20 33E 486/25E	4Meg	ZA3800MK	180.00
Z386SX	2Meg	2-60S 1 modules	119.00

MAGNAVOX

286 386SX-16 386SX 20 486SX 20 & 386 33 *all are 72PIN SIMM*

1MEG - 59.00 4MEG - 180.00 8MEG - 349.00 16MEG - 659.00

MEMORY BOARDS
IBM Compatibles & PS/2

USES SIMMS

BOCA AT PLUS

16 BIT MEMORY EXPANSION FOR 286, 386 AT • 0K-8Meg Bd. 4.0 LIM Compat. • New 5 Yr Warr. Convert. Expnd. & Extnd. Memory • Supports DOS, OS/2, LIM/EMS & EEMS • Versatile Split Memory Addressing • Operates w/CPU Speeds to 33 MHz • Supports Desqview, Multitask operations • *Bd. made by Boca Research, AT plus*

0K - $84.00 2Meg - $159.00 4Meg - $239.00 8Meg - $399.00

BOCA XT 8 BIT BUS

• Expanded memory for XT • Lim 4.0 compat. 0-2Meg • Uses 256K chips

0-K - $99.00 1Meg $189.00 2Meg - $229.00

IBM P/S2 32BIT EXPANSION BD.

0-16Meg, Ext.-Expnd. Memory Bd. for P/S2 70, 80, 90, Lim 4.0

0Meg	2Meg	4Meg	8Meg	16Meg
$139.00	$239.00	$319.00	$499.00	$859.00

PS/2 MCA 0-8MEG EXPANSION BD.

0-8Meg Extended and/or Expanded Memory for all IBM P/S2 Models 50, 50Z, 60, 55SX, 65SX, 16 Bit, 4.0 LIM Compat.

0K 119.00 2Meg 199.00 4Meg 283.00 8Meg 449.00

USES 1 X 9 SIMMS BOCA BR MC 80

CHANGE YOUR 286 TO A 486

286 CPU PLCC Type 25/50 MHz 239.00
286 CPU PGA Type 25/50 MHz 239.00

• • CALL FOR OTHER EVERGREEN PRODUCTS • •

IBM PS/1, PS/2 MEMORY MODULES

IBM PART NO	WORKS WITH MODEL NO	PRICE
	30 86	174.00
	30 286, 25-286, 80 8MHz 80	104.00
	80 386	79.00
	55 SX, 311, 121, 321, 061, 161	84.00
	70 A21, 80-A21, 80 111 40 31*	189.00
2Meg	0-08, 661, 21, 502, 513E 615E, P 70	99.00
	55 SX, 65LS • Station 320 L • 30, 35LX, 35LS, 40SX	
4Meg/8Meg (2Meg)	95 XP 486 Desk Top, 9533 Tower, 7533 Tower, 7535 Tower, 9595 Via Pr 3257	99.00
1Meg	8525, 8530, 8535, 8540	35.00
4Meg	8550, 8555, 8560, 8570, 8580	175.00
4Meg	8525, 8530, 8535, 8540	175.00
4Meg	8550, 8555, 8560, 8570, 8580	175.00
1Meg	8525, 8530, 8535, 8540	49.00
4Meg	8550, 8555, 8560, 8570, 8580	108.00
4Meg	8525, 8530, 8535, 8540	169.00
4Meg	8550, 8555, 8560, 8570, 8580	175.00
4Meg	9570, 9585, 9590, 9595, 9533 • 40Meg	175.00
4Meg	7533 • 9570, 7533 • 80Meg	338.00
4Meg	6G0 1622, 9570, 7504 • 16Meg	608.00
4Meg	8573, 8595, 9595 • 32Meg	1239.00
4Meg	9570, 9585, 9590, 9595	90.00
4Meg/16Meg (2Meg)	9570, 9585, 9590, 9595	175.00
4Meg	8525, 8530, 8535, 8540	169.00
4Meg	8550, 8555, 8560, 8570, 8580	175.00
4Meg	8525, 8530, 8535, 8540	338.00
4Meg	8550, 8555, 8560, 8570, 8580	608.00
4Meg	8525, 8530, 8535, 8540	1239.00
4Meg	8550, 8555, 8560, 8570, 8580	90.00
4Meg/16Meg (2Meg)	9570, 9585, 9590, 9595	175.00

IBM NOTEBOOK & LAPTOP MEMORY

1Meg	350 360c PS Note 425
2Meg	350 360c PS Note 425
4Meg	350 360c PS Note 425
8Meg	350 360c PS Note 425

COMPAQ MEMORY MODULES

MODEL	AMT. UPGRADED	CMPQ PART #	PRICE
DeskPro 386/33, 386/33L, 486/25, 486/33L	2Meg Module	115144-001	109.00
	8Meg Module	115561-001	399.00
486/50L System Pro	32Meg Module	116568-001	1299.00
DeskPro 386/33L, 486/33L	Exp Bd	116569-001	279.00
DeskPro 386/25, 386/20	1Meg Module	113131-001	79.00
	4Meg Module	113132-001	199.00
	1Meg Exp Bd	113633-001	149.00
	4Meg Exp Bd	113634-001	279.00
DeskPro 386/20E	1Meg Module	113646-001	79.00
	4Meg Module	112534-001	199.00
DeskPro 386/20E	1Meg Exp Bd	113644-001	149.00
	4Meg Exp Bd	113645-001	279.00
DeskPro 386/25E	1Meg Module	113131-001	79.00
	4Meg Module	113132-001	199.00
DeskPro 386M, 386SX/20, all "M" series, sytem LT series, all "T" series	1Meg Module	116638-001	89.00
	4Meg Module	116639-001	229.00
	8Meg Module	116640-001	899.00
Systempro Exp Bd	0-64Meg	129160-001	189.00
DeskPro 386/16	1Meg Bd	100070-001	99.00
	4Meg Kit	100071-001	299.00
DeskPro 286	1.2Meg Exp Bd	108069-001	239.00
DeskPro 5/80, 5/66M, 5/66M	4.0Meg Exp Bd	108070-001	437.00
Prosignia 5/66	512K Kit	113301-001	49.00
Prolant 120 5/60	1Meg Kit	149011-001	399.00
Prolant 2000 4/33, 5/66	32Meg Kit	149949-001	899.00
Prolant 4000 4/50, 5/66	64Meg Kit	149912-001	1356.00
Prolinea 386 3/25S, 3/25ZS	128Meg Kit	149913-001	2519.00
	2Meg	149914-001	5799.00
	8Meg	141738-001	90.00
Prolinea 486 4/25S, 4/33, 4/50, 4/66 CDS	16Meg	141742-001	316.00
Enhanced Prolinea Prosario series	2Meg	141683-001	95.00
	8Meg	141684-001	175.00
	32Meg	141685-001	339.00
Prosignia PC Server 486/33	8Meg	141686-001	189.00
486 DX2/66	32Meg	141687-001	379.00
	128Meg	141747-001	1199.00

ALL OF THESE MODULES ARE INTERCHANGEABLE WITH THESE MODELS

COMPAQ LAPTOPS & NOTEBOOKS

LTE 286	4Meg Bd	179.00
LTE 386S/20	4Meg Module	209.00
LTE / LTE 20 25 25C	4Meg Module	209.00
LTE / LTE 20 25 25C	8Meg Module	309.00
LTE / LTE 20 25 25C	16Meg Module	709.00
LTE / LTE 425C 33C/25E/25L	4Meg Module	189.00
LTE / LTE 425C 33C/25E/25L	8Meg Module	329.00
LTE / LTE 425C 33C/25E/25L	16Meg Module	639.00
SLT/286	4Meg Module	189.00
SLT/386	2Meg Module	109.00
SLT/386	4Meg Module	219.00
Concerto LTE Elite	4Meg	189.00
	8Meg	389.00
	16Meg	689.00
Contura 320, 325	4Meg	189.00
	8Meg	389.00
	4Meg	189.00
	8Meg	339.00
Contura 400, 410	4Meg/8Meg/16Meg	189/389/739
Contura 4/25, 4/25C, 4/25CX	4Meg	189.00
	8Meg	339.00
	16Meg	689.00
Aero 4/25, 4/33L	4Meg	184.00
	8Meg	359.00

NO SURCHARGE FOR MASTERCARD, AMEX, VISA OR DISCOVER. PURCHASE ORDERS ACCEPTED FROM FOR-[illegible] ... & GOVERNMENT AGENCIES. [illegible] Returned orders or ordered wrong parts are subject to a 20% restocking fee. Memory chips not installed in boards. We accept international orders at current exchange rates. Customers are responsible for duties, taxes and other charges if shipped int'l. All credit card charges verified for fraudulent use. SORRY, NO REFUNDS AFTER 30 DAYS - EXCHANGES ONLY. If you received defective merchandise or exchange only, no refunds. We accept MC, VISA, Discover, AE, money orders, purchase orders and transfer. 20% cashiers check, orders, cash & cashiers checks. Orders shipped by UPS. FEDEX must be agreed to.

CUSTOMER SERVICE & TECHNICAL: OPEN M-F, 9-4 PST

All products brand new & guaranteed • We buy excess inventory

Trademarks are registered with their respective companies.

L.A. TRADE

22825 Lockness Avenue • Torrance, CA 90501

TOSHIBA LAPTOP MEMORY

	AMT. UPGRADED	MANU. PART #	PRICE
286e	2Meg	PC-PA2002U	99.00
286e	4Meg	PC-PA2001U	199.00
286e	8Meg	PC-PA2003U	399.00
4400CS	4Meg	PC-PA2008U	189.00
4400CS	8Meg	PC-PA2009U	389.00
4400CS	4Meg	PC-PA2010U	699.00
4400CS	8Meg	PC-PA2011U	189.00
4400CS	4Meg	PC-PA2012U	389.00
4400CS	8Meg	PC-PA2013U	699.00
T4	1Meg	PC-PA2014U	169.00
T4	2Meg	PC-PA2015U	349.00
T4	4Meg	PC-PA2016U	699.00
T4	8Meg	PC-PA2017U	1349.00
T4	16Meg	PC-PA2018U	2699.00
T4	32Meg	PC-PA2019U	5399.00
T4	64Meg	PC-PA2020U	10799.00
T4	128Meg	PC-PA2021U	21599.00
T4	256Meg	PC-PA2022U	43199.00
T4	512Meg	PC-PA2023U	86399.00
T4	1024Meg	PC-PA2024U	172799.00
T4	2048Meg	PC-PA2025U	345599.00
T4	4096Meg	PC-PA2026U	691199.00
T4	8192Meg	PC-PA2027U	1382399.00
T4	16384Meg	PC-PA2028U	2764799.00
T4	32768Meg	PC-PA2029U	5529599.00
T4	65536Meg	PC-PA2030U	11059199.00
T4	131072Meg	PC-PA2031U	22118399.00
T4	262144Meg	PC-PA2032U	44236799.00
T4	524288Meg	PC-PA2033U	88473599.00
T4	1048576Meg	PC-PA2034U	176947199.00
T4	2097152Meg	PC-PA2035U	353894399.00
T4	4194304Meg	PC-PA2036U	707788799.00
T4	8388608Meg	PC-PA2037U	1415577599.00
T4	16777216Meg	PC-PA2038U	2831155199.00
T4	33554432Meg	PC-PA2039U	5662310399.00
T4	67108864Meg	PC-PA2040U	11324620799.00
T4	134217728Meg	PC-PA2041U	22649241599.00
T4	268435456Meg	PC-PA2042U	45298483199.00
T4	536870912Meg	PC-PA2043U	90596966399.00
T4	1073741824Meg	PC-PA2044U	181193932799.00
T4	2147483648Meg	PC-PA2045U	362387865599.00
T4	4294967296Meg	PC-PA2046U	724775731199.00
T4	8589934592Meg	PC-PA2047U	1449551462399.00
T4	17179869184Meg	PC-PA2048U	2899102924799.00
T4	34359738368Meg	PC-PA2049U	5798205849599.00
T4	68719476736Meg	PC-PA2050U	11596411699199.00
T4	137438953472Meg	PC-PA2051U	23192823398399.00
T4	274877906944Meg	PC-PA2052U	46385646796799.00
T4	549755813888Meg	PC-PA2053U	92771293593599.00
T4	1099511627776Meg	PC-PA2054U	185542587187199.00
T4	2199023255552Meg	PC-PA2055U	371085174374399.00
T4	4398046511104Meg	PC-PA2056U	742170348748799.00
T4	8796093022208Meg	PC-PA2057U	1484340697497599.00
T4	17592186044416Meg	PC-PA2058U	2968681394995199.00
T4	35184372088832Meg	PC-PA2059U	5937362789990399.00
T4	70368744177664Meg	PC-PA2060U	11874725579980799.00
T4	140737488355328Meg	PC-PA2061U	23749451159961599.00
T4	281474976710656Meg	PC-PA2062U	47498902319923199.00
T4	562949953421312Meg	PC-PA2063U	94997804639846399.00
T4	1125899906842624Meg	PC-PA2064U	189995609279692799.00
T4	2251799813685248Meg	PC-PA2065U	379991218559385599.00
T4	4503599627370496Meg	PC-PA2066U	759982437118771199.00
T4	9007199254740992Meg	PC-PA2067U	1519964874237542399.00
T4	18014398509481984Meg	PC-PA2068U	3039929748475084799.00
T4	36028797018963968Meg	PC-PA2069U	6079859496950169599.00
T4	72057594037927936Meg	PC-PA2070U	12159718993900339199.00
T4	144115188075855872Meg	PC-PA2071U	24319437987800678399.00
T4	288230376151711744Meg	PC-PA2072U	48638875975601356799.00
T4	576460752303423488Meg	PC-PA2073U	97277751951202713599.00
T4	1152921504606846976Meg	PC-PA2074U	194555503902405427199.00
T4	2305843009213693952Meg	PC-PA2075U	389111007804810854399.00
T4	4611686018427387904Meg	PC-PA2076U	778222015609621708799.00
T4	9223372036854775808Meg	PC-PA2077U	1556444031219243417599.00
T4	18446744073709551616Meg	PC-PA2078U	3112888062438486835199.00
T4	36893488147419103232Meg	PC-PA2079U	6225776124876973670399.00
T4	73786976294838206464Meg	PC-PA2080U	12451552249753947340799.00
T4	147573952589676412928Meg	PC-PA2081U	24903104499507894681599.00
T4	295147905179352825856Meg	PC-PA2082U	49806208999015789363199.00
T4	590295810358705651712Meg	PC-PA2083U	99612417998031578726399.00
T4	1180591620717411303424Meg	PC-PA2084U	199224835996063157452799.00
T4	2361183241434822606848Meg	PC-PA2085U	398449671992126314905599.00
T4	4722366482869645213696Meg	PC-PA2086U	796899343984252629811199.00
T4	9444732965739290427392Meg	PC-PA2087U	1593798687968505259622399.00
T4	18889465931478580854784Meg	PC-PA2088U	3187597375937010519244799.00
T4	37778931862957161709568Meg	PC-PA2089U	6375194751874021038489599.00
T4	75557863725914323419136Meg	PC-PA2090U	12750389503748042076979199.00
T4	151115727451828646838272Meg	PC-PA2091U	25500779007496084153958399.00
T4	302231454903657293676544Meg	PC-PA2092U	51001558014992168307916799.00
T4	604462909807314587353088Meg	PC-PA2093U	102003116029984336615833599.00
T4	1208925819614629174706176Meg	PC-PA2094U	204006232059968673231667199.00
T4	2417851639229258349412352Meg	PC-PA2095U	408012464119937346463334399.00
T4	4835703278458516698824704Meg	PC-PA2096U	816024928239874692926668799.00
T4	9671406556917033397649408Meg	PC-PA2097U	1632049856479749385853337599.00
T4	19342813113834066795298816Meg	PC-PA2098U	3264099712959498771706675199.00
T4	38685626227668133590597632Meg	PC-PA2099U	6528199425918997543413350399.00
T4	77371252455336267181195264Meg	PC-PA2100U	13056398851837995086826700799.00
T4	154742504910672534362390528Meg	PC-PA2101U	26112797703675990173653401599.00
T4	309485009821345068724781056Meg	PC-PA2102U	52225595407351980347306803199.00
T4	618970019642690137449562112Meg	PC-PA2103U	104451190814703960694613606399.00
T4	1237940039285380274899124224Meg	PC-PA2104U	208902381629407921389227212799.00
T4	2475880078570760549798248448Meg	PC-PA2105U	417804763258815842778454425599.00
T4	4951760157141521099596496896Meg	PC-PA2106U	835609526517631685556908851199.00
T4	9903520314283042199192993792Meg	PC-PA2107U	1671219053035263371113817702399.00
T4	19807040628566084398385987584Meg	PC-PA2108U	3342438106070526742227635404799.00
T4	39614081257132168796771975168Meg	PC-PA2109U	6684876212141053484455270809599.00
T4	79228162514264337593543950336Meg	PC-PA2110U	13369752424282106968910541619199.00
T4	158456325028528675187087900672Meg	PC-PA2111U	26739504848564213937821083238399.00
T4	316912650057057350374175801344Meg	PC-PA2112U	53479009697128427875642166476799.00
T4	633825300114114700748351602688Meg	PC-PA2113U	106958019394256855751284332953599.00
T4	1267650600228229401496703205376Meg	PC-PA2114U	213916038788513711502568665907199.00
T4	2535301200456458802993406410752Meg	PC-PA2115U	427832077577027423005137331814399.00
T4	5070602400912917605986812821504Meg	PC-PA2116U	855664155154054846010274663628799.00
T4	10141204801825835211973625643008Meg	PC-PA2117U	1711328310308109692020549327257599.00
T4	20282409603651670423947251286016Meg	PC-PA2118U	3422656620616219384041098654515199.00
T4	40564819207303340847894502572032Meg	PC-PA2119U	6845313241232438768082197309030399.00
T4	81129638414606681695789005144064Meg	PC-PA2120U	13690626482464877536164394618060799.00
T4	162259276829213363391578010288128Meg	PC-PA2121U	27381252964929755072328789236121599.00
T4	324518553658426726783156020576256Meg	PC-PA2122U	54762505929859510144657578472243199.00
T4	649037107316853453566312041152512Meg	PC-PA2123U	109525011859719020289315156944486399.00
T4	1298074214633706907132624082305024Meg	PC-PA2124U	219050023719438040578630313888972799.00
T4	2596148429267413814265248164610048Meg	PC-PA2125U	438100047438876081157260627777945599.00
T4	5192296858534827628530496329220096Meg	PC-PA2126U	876200094877752162314521255555891199.00
T4	10384593717069655257060992658440192Meg	PC-PA2127U	1752400189755504324629042511111782399.00
T4	20769187434139310514121985316880384Meg	PC-PA2128U	3504800379511008649258085022223564799.00
T4	41538374868278621028243970633760768Meg	PC-PA2129U	7009600759022017298516170044447129599.00
T4	83076749736557242056487941267521536Meg	PC-PA2130U	14019201518044034597032340088894259199.00
T4	166153499473114484112975882535043072Meg	PC-PA2131U	28038403036088069194064680177788518399.00
T4	332306998946228968225951765070086144Meg	PC-PA2132U	56076806072176138388129360355577036799.00
T4	664613997892457936451903530140172288Meg	PC-PA2133U	112153612144352276776258720711154073599.00
T4	1329227995784915872903807060280344576Meg	PC-PA2134U	224307224288704553552517441422308147199.00
T4	2658455991569831745807614120560689152Meg	PC-PA2135U	448614448577409107105034882844616294399.00
T4	5316911983139663491615228241121378304Meg	PC-PA2136U	897228897154818214210069765689232588799.00
T4	10633823966279326983230456482242756608Meg	PC-PA2137U	1794457794309636428420139531378465177599.00
T4	21267647932558653966460912964485513216Meg	PC-PA2138U	3588915588619272856840279062756930355199.00
T4	42535295865117307932921825928971026432Meg	PC-PA2139U	7177831177238545713680558125513860710399.00
T4	85070591730234615865843651857942052864Meg	PC-PA2140U	14355662354477091427361116251027721420799.00
T4	170141183460469231731687303715884105728Meg	PC-PA2141U	28711324708954182854722232502055442841599.00
T4	340282366920938463463374607431768211456Meg	PC-PA2142U	57422649417908365709444465004110885683199.00
T4	680564733841876926926749214863536422912Meg	PC-PA2143U	114845298835816731418888930008221771366399.00
T4	1361129467683753853853498429727072845824Meg	PC-PA2144U	229690597671633462837777860016443542732799.00
T4	2722258935367507707706996859454145691648Meg	PC-PA2145U	459381195343266925675555720032887085465599.00
T4	5444517870735015415413993718908291383296Meg	PC-PA2146U	918762390686533851351111440065774170931199.00
T4	10889035741470030830827987437816582766592Meg	PC-PA2147U	1837524781373067702702222880131548341862399.00
T4	21778071482940061661655974875633165533184Meg	PC-PA2148U	3675049562746135405404445760263096683724799.00
T4	43556142965880123323311949751266331066368Meg	PC-PA2149U	7350099125492270810808891520526193367449599.00
T4	87112285931760246646623899502532662132736Meg	PC-PA2150U	14700198250984541621617783041052386734899199.00
T4	174224571863520493293247799005065324265472Meg	PC-PA2151U	29400396501969083243235566082104773469798399.00
T4	348449143727040986586495598010130648530944Meg	PC-PA2152U	58800793003938166486471132164209546939596799.00
T4	696898287454081973172991196020261297061888Meg	PC-PA2153U	117601586007876332972942264328419093879193599.00
T4	1393796574908163946345982392040522594123776Meg	PC-PA2154U	235203172015752665945884528656838187758387199.00
T4	2787593149816327892691964784081045188247552Meg	PC-PA2155U	470406344031505331891769057313676375516774399.00
T4	5575186299632655785383929568162090376495104Meg	PC-PA2156U	940812688063010663783538114627352751033548799.00
T4	11150372599265311570767859136324180752990208Meg	PC-PA2157U	1881625376126021327567076229254705502067097599.00
T4	22300745198530623141535718272648361505980416Meg	PC-PA2158U	3763250752252042655134152458509411004134195199.00
T4	44601490397061246283071436545296722011960832Meg	PC-PA2159U	7526501504504085310268304917018822008268390399.00
T4	89202980794122492566142873090593444023921664Meg	PC-PA2160U	15053003009008170620536609834037644016536780799.00
T4	178405961588244985132285746181186888047843328Meg	PC-PA2161U	30106006018016341241073219668075288033073561599.00
T4	356811923176489970264571492362373776095686656Meg	PC-PA2162U	60212012036032682482146439336150576066147123199.00
T4	713623846352979940529142984724747552191373312Meg	PC-PA2163U	120424024072065364964292878672301152132294399.00
T4	1427247692705959881058285969449495104382746624Meg	PC-PA2164U	240848048144130729928585757344602304264588799.00
T4	2854495385411919762116571938898990208765493248Meg	PC-PA2165U	481696096288261459857171514689204608529177599.00
T4	5708990770823839524233143877797980417530986496Meg	PC-PA2166U	963392192576522919714343029378409217058355199.00
T4	11417981541647679048466287755595960835061972992Meg	PC-PA2167U	1926784385153045839428686058756818434116710399.00
T4	22835963083295358096932575511191922170123945984Meg	PC-PA2168U	3853568770306091678857372117513636868233420799.00
T4	45671926166590716193865151022383844340247891968Meg	PC-PA2169U	7707137540612183357714744235027273736466841599.00
T4	91343852333181432387730302044767688680495783936Meg	PC-PA2170U	15414275081224366715429488470054547472933683199.00
T4	182687704666362864775460604089535377360991567872Meg	PC-PA2171U	30828550162448733430858976940109094945867366399.00
T4	365375409332725729550921208179070754721983135744Meg	PC-PA2172U	61657100324897466861717953880218189891734732799.00
T4	730750818665451459101842416358141509443966271488Meg	PC-PA2173U	123314200649794933723435907760436379783469465599.00
T4	1461501637330902918203684832716283018887932542976Meg	PC-PA2174U	246628401299589867446871815520872759566938931199.00
T4	2923003274661805836407369665432566037775865085952Meg	PC-PA2175U	493256802599179734893743631041745519133877862399.00
T4	5846006549323611672814739330865132075551730171904Meg	PC-PA2176U	986513605198359469787487262083491038267755724799.00
T4	11692013098647223345629478661730264151103460343808Meg	PC-PA2177U	1973027210396718939574974524166982076535511449599.00
T4	23384026197294446691258957323460528302206920687616Meg	PC-PA2178U	3946054420793437879149949048333964153071022899199.00
T4	46768052394588893382517914646921056604413841375232Meg	PC-PA2179U	7892108841586875758299898096667928306142045798399.00
T4	93536104789177786765035829293842113208827682750464Meg	PC-PA2180U	15784217683173751516599796193335856612284091596799.00
T4	187072209578355573530071658587684226417655365500928Meg	PC-PA2181U	31568435366347503033199592386671713224568183193599.00
T4	374144419156711147060143317175368453031310731001856Meg	PC-PA2182U	63136870732695006066399184773343426449136366387199.00
T4	748288838313422294120286634350736906063021462003712Meg	PC-PA2183U	126273741465390012132798369546686852898272732774399.00
T4	1496577676626844588240573268701473812126042924007424Meg	PC-PA2184U	252547482930780024265596739093373705796545465548799.00
T4	2993155353253689176481146537402947624252085848014848Meg	PC-PA2185U	505094965861560048531193478186747411593090931097599.00
T4	5986310706507378352962293074805895248504171696029696Meg	PC-PA2186U	1010189931723120097062386956373494823186181862195199.00
T4	11972621413014756705924586149611790496008343392059392Meg	PC-PA2187U	2020379863446240194124773912746989646372363724390399.00
T4	23945242826029513411849172299223580992016686784118784Meg	PC-PA2188U	4040759726892480388249547825493979292744727448780799.00
T4	47890485652059026823698344598447161984033373568237568Meg	PC-PA2189U	8081519453784960776499095650987958585489454897561599.00
T4	95780971304118053647396689196894323968066747136475136Meg	PC-PA2190U	16163038907569921552998191301975917170978909795123199.00
T4	191561942608236107294793378393788647936133494272950272Meg	PC-PA2191U	32326077815139843105996382603951834341957819590246399.00
T4	383123885216472214589586756787577295872266988545900544Meg	PC-PA2192U	64652155630279686211992765207903668683915639180492799.00
T4

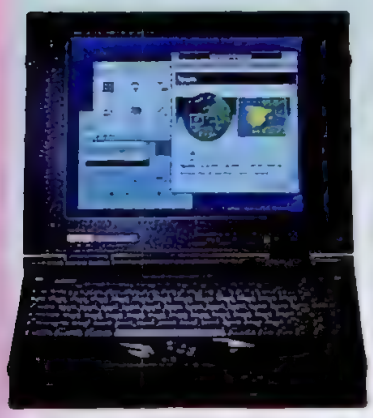
Hewlett–Packard

Quality DeskJet/LaserJet Printers and Notebooks

HP OmniBook Notebook PCs 4000 Series

Desktop to-go-PCs

Processor	Screen	Hard Drive	Price
486DX2/50	10.3" Dual Scan	260MB	$2499
486DX2/50	10.3" Dual Scan	340MB	2829
486DX2/50	10.3" Dual Scan	520MB	3199
486DX2/50	10.4" Active	340MB	3769
486DX2/50	10.4" Active	520MB	4129
486DX4/100	10.3" Dual Scan	340MB	3619
486DX4/100	10.3" Dual Scan	520MB	3999
486DX4/100	10.4" Active	340MB	4489
486DX4/100	10.4" Active	520MB	4829



HP OmniBook 4000 Notebook PC

HP OmniBook Notebook PCs 600 Series

Lightweight with Performance

Processor	Screen	Hard Drive	Price
486DX2/50	8.5" Dual Scan	170MB	$2549
486DX2/50	8.5" Dual Scan	260MB	2829
486DX4/75	8.5 Dual Scan	170 MB	3099
486DX4/75	8.5" Dual Scan	260MB	3379

HP OmniBook 600 Notebook PC

HEWLETT® PACKARD

CALL about our HP Scanners and HP (Colorado) Tape Drives

HP LaserJet Printers

HP LaserJet 4L	$499.99
HP LaserJet 4P	959.99
HP LaserJet 4ML	1019.99

HP LaserJet 4L Now Only $499.99

InkJet Printers

HP DeskJet 320	$299.99
HP DeskJet 320 w/Sheet Feeder	359.99
HP DeskJet 540	289.99
HP DeskJet 560C	479.99
HP DeskJet 1200C	999.99
HP DeskWriter 320	299.99
HP DeskWriter 320 w/Sheet Feeder	359.99
HP DeskWriter 540	289.99
HP DeskWriter 560C	479.99
HP DeskJet 1200C/PS	1589.99
HP OfficeJet	**769.99**

NEC

Versa P — Lowest Priced Pentium Notebook

Versa P

as low as **$4729**

Versa P

- ▲ 2 Type II or 1 Type III PCMCIA slot
- ▲ Removable hard drive, floppy & screen
- ▲ Integrated speaker and microphone
- ▲ MS DOS, Windows 3.1, Windows Sound System, MS Video for Windows Run Time

Processor	Screen	Hard Drive	Price
Pentium 75	9.5" Active	340MB	$4729
Pentium 75	9.5" Active	540MB	5099
Pentium 75	9.5" High Res.	540MB	5479
Pentium 75	9.5" Active	810MB	5599
Pentium 75	9.5" High Res.	810MB	5989

Versa M

as low as **$3219**

Versa M

- ▲ 2 Type II or 1 Type III PCMCIA slot
- ▲ Removable hard drive, floppy & screen
- ▲ Integrated speaker and microphone
- ▲ MS DOS, Windows 3.1, Windows Sound System, MS Video for Windows Run Time

Processor	Screen	Hard Drive	Price
486DX4/75	9.5" Dual Scan	340MB	$3219
486DX4/75	9.5" Active	540MB	4199
486DX4/75	9.5" High Res.	540MB	4589
486DX4/100	9.5" True Color	540MB	4819
486DX4/100	9.5" Active	810MB	5049
486DX4/100	9.5" High Res.	810MB	5429

Ready Multimedia Desktops

- ▲ Dual speed NEC CD-ROM drive
- ▲ SoundBlaster 16 sound card
- ▲ Speakers, microphone
- ▲ 14.4/14.4 Send/Receive Fax/Modem
- ▲ MS-DOS, Windows, Quicken and more
- ▲ CD titles: Compton's Encyclopedia, PFS Window Works

Processor	Hard Drive	Price
486DX2/66 Minitower	420MB	1449
P60 Minitower	420MB	1799

Business Lease: $53/mo.

NEC monitors start at $299.99

Versa V

- ▲ 4MB RAM expandable to 20MB
- ▲ 2 Type II or 1 Type III PCMCIA slot
- ▲ Removable hard drive
- ▲ Removable floppy – add second battery
- ▲ MS-DOS 6.21, Windows 3.1

Processor	Screen	Hard Drive	Price
486DX2/50	9.5" Dual Scan	250MB	$2369
486DX2/50	9.5" Dual Scan	340MB	2499
486DX2/50	9.5" Active	250MB	2889
486DX2/50	9.5" Active	340MB	3029
486DX2/50	9.5" Active	540MB	3399
486DX4/75	9.5" Active	340MB	3399
486DX4/75	9.5" Active	540MB	3779

Business Lease $87/mo.

TM 5000 Pentium Power with PCI Bus

Before You Buy

TI▲COMPAQ NEC▲IBM▲AST PACKARD BELL TOSHIBA▲HP

Shop and Compare

Don't Settle for Less

	PCs Compleat	Supplier 2	Supplier 3
Guaranteed Lowest Price	YES		
The Best Brand Names	YES		
30-day Money Back Guarantee	YES		
Never a Restocking Fee	YES		
30-day Price Protection	YES		
PC Computing Five Star Award	YES		
Lifetime *Toll-Free* Technical Support	YES		
FREE Hardware Configuration	YES		
FREE Software Installation	YES		
Same Day Shipment	YES		
Pre-Installed Software Discount	YES		
All Major Credit Cards Accepted	YES		
Never a Hidden Surcharge	YES		
$4.95 Shipping on Most Peripherals	YES		
Compaq Authorized for Direct Marketing	YES		
90 Days Same As Cash	YES		
Hewlett Packard and IBM Authorized	YES		
Low-Cost Business Leases	YES		
Volume Purchase Agreements	YES		
Customer Satisfaction Is Top Priority	YES		

PCs COMPLEAT

800-775-4727

Internet:sales@pcscompleat.com

International (508) 624-6400

Open 24 Hours

Weekdays

Weekends & Holidays 8 a.m. to 5 p.m. EST

© PCs Compleat All prices subject to change and do not include shipping Monitors sold separately Lease prices reflect 36 month operating lease to approved business customers All products or brand names are trademarks of their respective companies PCs Compleat, 34 St Martin Drive, Marlborough, MA 01752 Phone (508) 480-8500 Not responsible for typographical errors.

CALL FOR GUARANTEED LOWEST PRICE

IBM®

The Ultimate in Portable Multimedia

Call for FREE Product Guide 800-775-4727

Compaq

Dependable and Hassle Free

NOW AVAILABLE!

ThinkPad® 755CE, CSE and the ThinkPad® 755CD

- 8MB RAM expandable to 40MB
- Built-in 16-bit stereo sound, 14.4 data fax modem, telephone answering machine, speaker phone & infrared port (DSP software upgradable chip)
- 2 Type II or 1 Type III PCMCIA slot
- 20 popular software titles included!

Processor	Screen	Hard Drive	Price
486DX4/100	10.4" Dual Scan	340MB	$4599
486DX4/100	10.4" Dual Scan	540MB	4949
486DX4/100	10.4" Dual Scan	810MB	5399
486DX4/100	10.4" Active	340MB	5599
486DX4/100	10.4" Active	540MB	5999
486DX4/100	10.4" Active	810MB	6399
486DX4/100	10.4" Active	540MB	7049*
486DX4/100	10.4" Active	810MB	7499*

** Features built-in CD-ROM Drive*

ThinkPad® 755CD

IBM Aptivas® and PC 300 Desktops Available

ThinkPad® 360E Notebooks

as low as $3049

Processor	Screen	Hard Drive	Price
486DX2/50	9.5" Dual Scan	340MB	$2699
486DX2/50	9.5" Dual Scan	540MB	3049
486DX2/50	8.4" Active	340MB	3099
486DX2/50	8.4" Active	540MB	3449

ThinkPad® 701 Notebooks

- Full-sized keyboard
- 10.4" display
- Only 4.5 lbs.

Call for Details

ProLinea Desktops

- 4MB/8MB RAM expandable to 128MB/136MB
- 3.5" floppy drive
- PCI local bus graphics
- Plug and Play compliant
- Windows 95 ready
- MS DOS, Windows 3.1

Processor	RAM	Hard Drive	Price
486DX2/50	4MB	270MB	$1149
486DX2/66	8MB	420MB	1529
486DX4/100	8MB	420MB	1719

COMPAQ color monitors start at $279.99

Contura 410

- 486DX2/50 processor
- 4MB RAM expandable to 20MB
- 2 Type II or 1 Type III PCMCIA slot
- Large built-in trackball
- MS-DOS, Windows 3.1, Tabworks, Lotus Organizer

Display	Hard Drive	Price
9.5" Dual Scan	350MB	$2369
8.4" Active	350MB	2839

Business Lease: $87/mo.

COMPAQ

LTE Elite

Extra Performance on the road

NEW MODELS!

10.4" Active Matrix Color Display

- NEW! 10.4" Active Matrix color display
- 8MB RAM exp. to 32MB
- Integrated trackball
- Built-in AC adapter
- 2 Type II or 1 Type III PCMCIA slot
- MS-DOS 6.2, Windows 3.1, MS Video for Windows Run Time, Tabworks

Processor	Screen	Hard Drive	Price
486DX4/75	9.5" Dual Scan	340MB	$3129
486DX4/75	9.5" Dual Scan	510MB	3499
486DX4/75	10.4" Active	510MB	5029
486DX4/75	10.4" Active	810MB	5389

Business Lease: $103/mo.

LTE Elite

AST

You Can't Beat Its Value

AST Advantage!

Adventure Multimedia

- Quad speed IDE CD-ROM drive
- 16-bit Creative Labs SoundBlaster
- 14.4 Send/Receive Fax modem **with telephone answering and speaker phone**
- LOADS of FREE Software (titles included differ by model)
- 3-Year Warranty

Model	RAM	Hard Drive
486DX2/66	8MB	540MB
486DX2/66	4MB	540MB
486DX2/66	8MB	540MB
Pentium 75MHz	8MB	540MB
Pentium 75MHz	8MB	1GB
Pentium 90MHz	8MB	1GB
Pentium 100MHz	8MB	1GB

CALL for latest pricing

**AST Color Monitors start at $349.99*

AST, AST logo are trademarks of AST Research, Inc. All rights reserved.

AST Ascentia 910N

- 10.4" Active and 10.3" Dual Scan Displays
- NEW! Lithium Ion Battery for extra long life
- PanVision graphics for up to 1024x768 resolution
- 2 Type II or 1 Type III PCMCIA slot

Processor	Screen	Hard Drive	Price
486DX2/50	10.3" Dual Scan	340MB	$2749
486DX4/75	10.3" Dual Scan	510MB	3149
486DX4/75	10.4" Active	510MB	4129
486DX4/75	10.4" Active	700MB	4519

Ascentia 910N

Ascentia 810N

- LARGE, 10.4" Dual Scan displays
- 4MB RAM expandable to 20MB
- Removable hard drive and floppy drive
- 2 Type II or 1 Type III PCMCIA slot

Model	Screen	Hard Drive	Price
486DX2/66	10.4 Dual Scan	250MB	$ 2399
486DX2/66	10.4 Dual Scan	340MB	2539
486DX2/66	10.4 Dual Scan	510MB	2689

Business Lease: $88/mo.

Packard Bell

The Number One Name in Multimedia

Packard Bell

Force Multimedia

1.3GM of Software Preinstalled

- 16-bit SoundBlaster compatible sound card
- Quad speed CD-ROM drive
- Built-in 14.4 Send/Receive Fax modem with telephone answering
- PCI Local bus graphics and hard drive
- 1280x1024 resolution

Processor	RAM	Hard Drive	Price
Pentium 75MHz	8MB	850MB	$1809
Pentium 75MHz	8MB	1.275GB	1929
Pentium 75MHz (MT)	16MB	1.275GB	2299
Pentium 100MHz	8MB	1.275GB	2419
Pentium 100MHz(MT)	16MB	1.275GB	2759

Packard Bell monitors start at $229.99

Business Lease: $66/mo.

Multimedia Desktop

New! All-in-one Multimedia PC Only $1549

Call For Details

MEDIA READY

Multimedia Minitower

Call for FREE Product Guide
800-775-4727

Toshiba Direct

New Models...Low, Low Prices

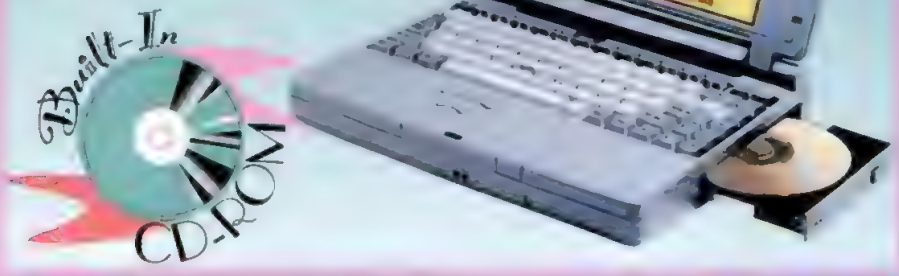
T2150
The Next Generation in Notebook Computing

NEW!

10.4" Active Matrix and Dual Scan Displays

- BUILT-IN CD-ROM DRIVE!
- 16-bit SoundBlaster, MIDI and .WAV compatible
- Built-in AC adapter
- 1 Type II or 1 Type III PCMCIA slot
- MS-DOS, Windows for Workgroups, RunTime Video for Windows, Windows Sound System

Processor	Screen	Hard Drive	Price
486DX4/75	10.4" Dual Scan	500MB	$3639
486DX4/75	10.4" Active	500MB	4749



T4900 *Your Dream Machine*

$5499

- 10.4" active matrix color display
- 772MB hard drive, 8MB/40MB
- Microsoft Sound System, built-in microphone, audio out port
- 1 Type II and 1 Type III PCMCIA slot
- MS-DOS 6.21, Windows for Workgroups 3.11 and more

75MHz Pentium

T4700, T4800 and T4850
Sight, Sound & Processing Power

- Brilliant color display with local bus video
- 1 Type II and 1 Type III PCMCIA slot
- Microsoft Sound System, built-in microphone, audio out port
- MS-DOS, Windows for Workgroups 3.11, UltraFont, Indeo video compression software

Model	Processor	Screen	Hard Drive	Price
T4700	486DX2/50	9.5" Active	320MB	$2999
T4800	486DX4/75	9.5" Active	500MB	4189
T4850	486DX4/75	10.4" Active	500MB	4519
T4850	486DX4/75	10.4" Active	772MB	4829

Portégé T3600
Award-Winning Subnote

- Ultra-portability at only 4.4 lbs.
- 8MB RAM expandable to 24MB
- PCMCIA Type II slot
- External 3.5" diskette drive
- Integrated Accupoint pointing device

Processor	Screen	Hard Drive	Price
486DX2/50	8.4" Active	500MB	$3719

Satellite Notebooks and Satellite Pro Series
Performance at an Outstanding Price

- Built-in AC Adapter (T2100 series)
- 2 Type II or 1 Type III PCMCIA slot (T2100 series), 1 Type II and 1 Type III PCMCIA slot (T2400 series)
- 82-key keyboard
- MS-DOS, Windows 3.1
- Accupoint pointing device
- Enhanced power management

	Model	Processor	Screen	Hard Drive	Price
	T2100	486DX2/50	9.5" Mono	250MB	$1439
	T2100	486DX2/50	10.4" Dual Scan	330MB	2249
	T2100	486DX2/50	8.4" Active	330MB	3099
Pro Series	T2400	486DX2/50	9.5" Dual Scan	250MB	2279
Pro Series	T2400	486DX2/50	9.5" Dual Scan	320MB	2449
Pro Series	T2400	486DX2/50	8.4" Active	250MB	2889
Pro Series	T2400	486DX2/50	8.4" Active	320MB	2949
Pro Series	T2450CT	486DX4/75	9.5" Active	320MB	3899
Pro Series	T2450CT	486DX4/75	9.5" Active	500MB	4199

Business Lease: $53/mo.

T2400

TOSHIBA

Texas Instruments

New TravelMate 5000

Pentium Powered with PCI Bus Technology

TravelMate 5000

NEW!

- **16.7 million colors on notebook display!**
- **Built-in** dual Lithium Ion batteries
- PCI bus architecture to optimize Pentium processor perform
- Removable hard drive
- 2MB Video RAM
- 16-bit sound, speaker, microphone and MIDI

as low as **$4999**

Processor	Screen	Hard Drive	Price
Pentium 75MHz	10.5" Dual Scan	500MB	$4999
Pentium 75MHz	10.4" Active	772MB	5599

TM 5000

TravelMate 4000M

- Brilliant color display
- 16-bit sound card
- Integrated pointing device
- 2 Type II or 1 Type III PCMCIA slot

Processor	Screen	Hard Drive	Price
486DX2/50	9.5" Dual Scan	340MB	$2119
486DX2/50	8.4" Active	455MB	2629
486DX4/75	9.5" Dual Scan	455MB	2799
486DX4/75	8.4" Active	340MB	3069
486DX4/75	8.4" Active	455MB	3319
486DX4/100	9.5" Active	525MB	4279

Business Lease: $78/mo.

TEXAS INSTRUMENTS

CD-ROM Docking Station: $809.99

PCM 5/95

PCs COMPLEAT

OPEN 24 HOURS Weekdays

800-775-4727

Internet: sales@pcscompleat.com

International (508) 624-6400

CIRCLE 268 ON READER SERVICE CARD

USA FLEX Tremendous Savings

IBM ThinkPad 360C

Only $1999

262030F

Sound Blaster Value CD Sound Blaster 16 Sound Card and 2X Internal CD-ROM Drive

Only $249

D1-VALUECD

HEWLETT PACKARD HP DeskJet 560C Printer

In Stock and Ready to Deliver!

Sharp 600x300 dpi, Up to 3 ppm, Up to 16.7M Colors, Dual Ink Cartridge System

Only $469

C2168A

Notebooks/Subnotebooks

NEC

VERSA V/500 250MB Dual Scan	$2264
VERSA V/50C 340MB Active	$3829
VERSA V/75C 340MB Active	$3397
VERSA M/750 340MB Active	$3114
VERSA M/75C 540MB Active	$4014
VERSA M/100C 810MB Active	$4729
VERSA M/1000C 810MB Active	$5017
VERSA P/75C 540MB Active	$4637
VERSA P/75C 810MB Active	$5384

ZENITH

Z-Star EX 002/50 Mono 260MB	$1607
Z-Star EX 002/50 Dual Scan 260MB	$2129
Z-Star EX 002/50 Active 340MB	$3144

EPSON

ActionNote 650 Mono 260MB	$1377
ActionNote 660C Dual Scan 340MB	$1837
ActionNote 660CX Act. Color 340MB	$3044
ActionNote 866C Dual Color 340MB	$2394
ActionNote 880C Dual Scan 340MB	$2879
ActionNote 880CX Act. Color 340MB	$4124

HEWLETT-PACKARD OMNIBOOK

600C 002-50 Dual Scan 170MB	$2539
600C 002-75 Dual Scan 170MB	$2879
4000 002/50 Dual Scan 340MB	$3849
4000 004-100 Act. Clr. 340MB	$4499

AT&T Globalyst 200

486 SX/33 Dual Scan 170MB	$2539
486 SX/33 Active Matrix 250MB	$3097
486 DX2/50 Dual Scan 170MB	$2849
486 DX2/50 Active Matrix 250MB	$4499

TOSHIBA

T1910CS 200 MB	$1737
T1960CS 200/320MB	$2034/$2197
T1960CT 200/320MB	$2577/ $2767
T2100 250MB	$1477
T2100CS 350MB	$2297
T2130CT 350MB	$3174
T2150CDS 500MB	$3694
T2150CDT 500MB	$4824
T2400CS 250/320MB	$2784/$2457
T2400CT 250/320MB	$2894/$3177
T2450CT 320/500 MB	$3974/$4247
T3400CT 250MB	$2247
T3600CT 500MB	$3784
T4700CT 200/320MB	$3997/$3117
T4800CT 500MB	$3784
T4850CT 500/810MB	$4574/$4874
T4900CT Pentium 810MB	$4377
T6600C CD-ROM ready	$5494
T6600C/D	$5997

IBM ThinkPad

510CS Pen Color 260MB	$1799
360 Mono 170/340MB	$1899/$2299
360CS Color Dual Scan 170MB	$2269
360CS Color Dual Scan 340MB	$2749
360C Color Active 340MB	$3999
701CS DX2 50 Dual Scan 360MB	$4999
701CS DX4-75 Dual Scan 540MB	$4999
701C DX2 50 Act. Color 360MB	$5499
701C DX4-75 Act. Color 540MB	$5999
755CS Color Dual Scan 170MB	$3899
340/540MB	$4399/$4799
755C Color Active 170MB	$4449
340/540MB	$4849/$5199
755CE Color Active 340MB	$4249
540/810MB	$4649/$5199
755CSE Color Active 340MB	$4899
540/810MB	$5299/$5849
755CD Color Active/CD ROM	
540/810MB	$5399/$5849

TEXAS INSTRUMENTS

TM4000 M DX2/50 Dual Scan 340MB	$2134
TM4000 M DX2/50 Active Color 455MB	$3634
TM4000 M DX4/75 Dual Scan 340MB	$2794
TM4000 M DX4/75 Active Color 340MB	$3847
TM4000 M DX4/75 Active Color 455MB	$3297
TM4000 M DX4/100 Dual Scan 524MB	$4227
TM5000 PENTIUM Active Color 810MB	$5779

Monitors/Video Cards

NEC

14" MultiSync 5FG	$307
15" MultiSync 3FG	$427
17" MultiSync 3FG	$747
15" MultiSync 3ES	$527
17" MultiSync 3ES	$967
21" MultiSync 3ES	$1927
15" MultiSync XP15	$427
17" MultiSync XP17	$1197
21" MultiSync XP21	$2257

HERCULES

Dynamite Pro 2MB ISA/VLB	$194
Dynamite Power 2MB VLB	$194
Dynamite Power 2MB PCI	$194
Stingray VLB 1MB VLB	$95
Stingray PCI 1MB PCI	$95
Graphite Accelerator 64 2MB VLB/PCI	$225
Graphite Accelerator 64 4MB VLB/PCI	$465

SONY

14" CPD-1430	$349
15" CPD-1530	$439
17" CPD-1730	$899
17" GDM-17SE11	$1019
20" GDM-20SE1	$1687

MAGNAVOX

14" 8479(Spanish)	$184
14" CM2089	$220
14" CM2099	$244
15" CM2015	$289
15" CM2089	$344
17" CM4918	$634
20" 20CM64	$1089

NOKIA

14" 4485	$299
15" 4496	$438
15" 4491	$487
17" 4478	$994
17" 4478/TCO	$1094
21" 4458	$2184

MAG Innovision

14" LR1458US	$220
15" MX15F-1	$328
15" MX15F-4	$458
17" MX17F	$618
17" MX17F	$898
21" MX21F	$1604

CTX

14" 1428DS	$199
14"1451IS	$245
14"1451GB	$255
14"1463IS	$279
14" 1463DB	$289
15" 1563DB	$319
15" 1565DB	$328
17" 1765DB	$438
17" 1785DB	$699

ORCHESTRA

14" Bugle	$219
14" Trumpet	$229
15" Horn	$309
17" Trumpet	$449
17" Tuba	$619

DIAMOND

SpeedStar Pro 1MB ISA	$95
SpeedStar 64 1MB ISA*	$149
SpeedStar 64 2MB ISA*	$195
Stealth 64 1MB VLB/PCI* DRAM	$149
Stealth 64 2MB VLB/PCI* DRAM	$199
Stealth 64 2MB VLB/PCI VRAM	$319
Stealth 64 4MB VLB/PCI VRAM	$459

*Includes Corel Draw 3.0

ATI Technology

Graphics Xpression 2MB ISA/VLB	$219
Graphics Xpression 2MB PCI	$219
Graphics Ultra Pro 2MB ISA/VLB	$329
Graphics Pro Turbo 2MB ISA/VLB/PCI	$329
Graphics Pro Turbo 4MB ISA/VLB/PCI	$389

EPSON

15" SVGA 28	$329
17" SVGA 28	$599

PANASONIC

14" PanaSync C1491	$249
15" PanaSync C 1591E (*includes $15 instant rebate)	$384*
17" PanaSync C 1791E (*includes $15 instant rebate)	$674*
21" PanaSync C-2192P	$1649

Printers...Laser/Ink Jet/Dot Matrix

EPSON

ACUMN Laser 1100/1400	$379/$599
ACTION Laser 1500/1600	$454/$754
LX300	$164
LQ-570+/1070+	$244/$374
FX-870/1170	$287/$374
LQ-300/870/1170	$196/$457/$614
LQ-2550 Clr	$967
DFX 5000+/8000	$1367/$2204
Stylus 800+/1000	$219/$427
Stylus Color	$499

PANASONIC PRINTERS

KX-P4400/P5400	$349*/$499
KX-P4430	$459
KX-P4440	$599
KX-SP100 Printer/Fax/Copier	$764
KX-P1150/P2023	$139/$175
KX-P2123/P3124	$249/ $319
KX-P2130/P2135	$169*/$195*
KX-P3696/P3626	$399/$589

DIGITAL

DECWRITER 90x/120x	$299/$379
DECLaserwriter 550x	$329
DECLaser 5100	$1149
DEC 3500	$1799

LEXMARK

4039 LaserPrinter 10 plus	$1219
Optra R/Rx	$1427/$1999
Optra L/Lx/Lxt	$1899/$2469/$2999
WinWriter Series	
Model 400/600	$757/$987
WinWriter 300/600	$445/$814
ExecJet IIc	$817
2300/2301 Plus Dot Matrix	$227/$329
2390/2391 Plus Dot Matrix	$347/$459
4226 Dot Matrix	$1799
IBM Color Jet Printer PS 4079	$949

OKIDATA PRINTERS

OL400E/OL410E	$399/$564
ML320-1/ML321-1	$299/$429
ML590-1/ML591-1	$424/$584

HP PRINTERS

HP DeskJet 320/540	$398/$584
HP DeskJet 540 Opt. Color Kit	$30
HP DeskJet 560C	$469
HP DeskJet 1200C/C PS	$997/$1582
HP Support Pack	CALL
HP LaserJet 4L/4P	$499/$949
HP OfficeJet Printer/Fax/Copier	$769

CANON

BJ-100/BJ-1053	$197/$229
BJ-200x/200ex/230	$224/$279/$384
BJC-4000/BJC-600e	$354/$458
LBP-430/LBP 1260	$577/$1267

TEXAS INSTRUMENTS

microLaser 600	$854
microLaser Pro 600 PS23	$1142
microLaser Pro E/ Power Pro	$1347/$1597
microWriter Printer	$464
microWriter PS23/PS65	$614/$824

BROTHER

HL-630/HL-645	$389/$439
HL-4550/HL-660	$579/$679
HL 1260	$1219

Modems/PCMCIA

HAYES

PCMCIA OPTIMA 14.4+FAX14.4	$185
ACCURA 144+FAX144 int/ext	$92/$112
ACCURA 288V FC+FAX int/ext	$185/$219
OPTIMA 144+FAX144 int/ext	$369/$369
OPTIMA 288 V FC+FAX int/ext	$379/$439
ESP Communications Accelerator	$75

US ROBOTICS

Sportster 14.4 Fax int/ext	$95/$109
Sportster 14.4 PCMCIA	$179
Sportster V.34 int/ext	$219/$229
Sportster V.34 PCMCIA	$349
Courier Dual Standard 14.4 PCMCIA	$349
Courier V.34 int/ext	$329/$419
Courier Dual Std 28.8 PCMCIA	$399

MOTOROLA

LIFESTYLE	
28.8/14.4 Fax external	$225
PCMCIA 14.4/14.4	$175
POWER	
28.8/14.4 Fax external	$259
PCMCIA Cellular 14.4/14.4	$229

MEGAHERTZ

PCMCIA E-JACK 14.4/14.4	$375
PCMCIA 14.4/14.4	$175
PCMCIA Gold Series E-JACK 14.4/14.4	$199
PCMCIA Gold Series 14.4/14.4	$199
PCMCIA Ethernet Modems	$489
PCMCIA 28.8/14.4	$355
Ethernet/Modem Combo 10Base-T/14.4	$419

NEW MEDIA

Ethernet LAN 10Base-T	$129
Ethernet LAN 10Base2/10Base-T Combo	$149
New Media 14.4 Data/Fax Modem	$125
Wav Jammer 16-bit Stereo Sound	$219
Bus Toaster SCSI-2 Adapter Card	$185
PCMCIA 16-bit Stereo & SCSI II	$489

BOCA

14.4 w/FAX internal/external	$79/$105
14.4/14.4 Multimedia	$119
Sound Expression 14.4/16bit Sound	$159
14.4 Pocket w/FAX	$155
V.34 28,800 bps Modem int/ext	$169/$209

MULTIMEDIA KITS / CD-ROM DRIVES / SPEAKERS

FLEX

FLEX CD Drive Upgrade Kit	$119
FLEX CD-PRO Value	$199
FLEX CD-Pro External	$219

NEC

MultiSpin 2V	$169
MultiSpin 2V Deluxe	$284
MultiSpin 3Xp	$379
MultiSpin 3Xp Plus Kit	$449
MultiSpin 4Xi	$368
MultiSpin 4Xe	$458
MultiSpin 4Xi kit	$469
MultiSpin 4Xe kit	$549

TEAC

CD-55A (Quad Speed)	$229

CREATIVE LABS

GenesCD	$179
GenesCD 2X SCSI	$345
GenesCD 4X SCSI	$395
Discovery CD 16 Now Edition	$289
Sound Blaster Value CD	$249
Digital Soundware	$299
Multimedia Home 4X	$449
Sound Blaster Value Edition	$69
Sound Blaster Pro Value Edition	$69
Sound Blaster 16 SCSI-2	$179
Sound Blaster 16 SCSI-2 w/DSP	$199
Sound Blaster AWE32	$299
Sound Blaster AWE32 Value Edit	$229
Advanced Signal Proc Upgrade Kit	$55
Wave Blaster II	$145
Voice Assist	$55

ORCHID

Videola	$359
Videola Premium ProD	$544
SoundWave 32 Pro	$185

MICRORESOLUTIONS

Book Pack Portable 4x	$254

MEDIAVISION

Premium 3-D (SCSI/MCD)	$145
Wavetable Upgrade Card	$145
Pro 3-D	$265
Base Portable CD-ROM	$278

ADS

TV Elite ext	$199
TV Elite int	$135
TV Elite A/V	$169
Audio Rack-It	$59
PC Promotions	$319
Video Clipper	$389

TURTLE BEACH

MonteCarlo Game Card	$89
Tropez	$195
MultiSound Monterey	$345
Entertainer	$369
Performer	$459

AI TECH

MultiPro CTV	$235
Pro/CTV Plus	$145
Wavewatcher TV	$389
Wireless Bundle Game Control	$49

ALTEC LANSING

ACS51	$75

JENSEN/POWER PARTNERS

JPS35/JPS45	$65/$119
AR22/AR42	$99/$155
AR570	$279

PANASONIC

EAB401P Speakers	$49
EAB710P Speakers	$99
KXL-8720 Portable CD-ROM	$299

SONY

SRS-59PC	$89
CSS-8100	$99
SRS-929PC	$165

Scanners

RELISYS

Rali 2412/Rali 4816	$789/$979
Rali 9612	$1479
Rali MonoScan II	$79
Rali Handheld MorphingScan	$178
Rali MonoScan 30 w/CardBrow 4	$499
AMEC Colorer 2400	$689
AMEC MonoScan Scanner/Fax	$328

UMAX

Vista T-630	$499
Vista S-6/S-6Pro	$649/$749
Vista S-8/S-8Pro	$729/$829
UC1260/UC1260Pro	$829/$929
MiraLook Color	$349

NEWLETT-PACKARD

ScanJet IIc CX Color	$949
ScanJet 3P Mono	$469

MUSTEK

TwainScan 256	$89
TwainScan Color 24	$179
PrisScan Color	$229
TwainScan Duo 600	$479
Paragon 1200/2400	$899

MOUSE SYSTEMS

Pagebrush/256 Mono Handheld	$99
Pagebrush/256 Color Handheld	$189

EPSON

ES1200C	$1299
ES600C	$499
ES800C	$899

CANON

CX-4015 Color	$689
CX-3010 Grayscale	$309

Mail Order Made Easy! By...

USA FLEX

USA Flex, Inc., 471 Brighton Dr., Bloomingdale, IL 60108

Code # PM05A5

TO ORDER, CALL... 1-800-766-1940

Federal Express® Delivery Service Available

FedEx

No Surcharge On These Credit Cards

MasterCard VISA Discover

On All Your Computing Needs!

The Ultimate Multimedia Choice!

Flex PT75 Multimedia System with Pentium™ Processor

All For Only

$2995

- Intel Pentium 75MHz 64bit Processor
- 256K L2 Ultra-fast "Writeback" Cache
- 8MB RAM, Maximum 128MB
- 850MB EIDE Hard Drive
- 3.5" (1.44MB) Floppy Drive
- Quad-Speed Internal CD-ROM Drive
- Creative Labs Sound Blaster 16 Audio Board, 16bit CD quality sound
- Altech Lansing 30 watt Stereo Speakers w/Bass Sub-woofer
- Stereo Headphones, Joystick
- 21 CD Titles (10 CD Discs)
- 15" MultiScan Color Monitor .28 dp, 1024 x 768 @ 75Hz NI(62KHz horizontal scan)
- 64 bit PCI video accelerator card w/2 MB DRAM
- 14.4/14.4 Data/Fax Modem
- Accessory Kit
- 57 Professional Quality Fonts From Monotype

HEWLETT PACKARD
Authorized Dealer

- Hewlett-Packard DeskJet 540 Printer with Color Kit and Printer Cable

Microsoft Software Package including:

- MS DOS 6.22 • MS Windows for Workgroups 3.11
- MS Works for Windows • MS Money
- MS Best of Entertainment Pack
- MS Sound Bits

Now Includes

Internet Starter Kit

All you need to get on the Information Super Highway

The Flex Family Classic Edition

All Flex Systems come with 3 Year Warranty with FLEX express parts replacement

All For Only

$1995

- Intel 486DX4-100 Processor
- 256K L2 "Writeback" Cache
- 8MB RAM, Maximum 64MB
- 850MB EIDE Hard Drive
- 3.5" (1.44MB) Floppy Drive
- Sony Double-Spin Internal CD-ROM Drive
- Creative Labs Sound Blaster Sound Card,16bit CD quality sound
- 15" MultiScan Color Monitor, .28 dp, 1280x1024*i*
- 64 bit VLB video accelerator card w/2MB RAM, 16,7M colors @ 800x600
- Amplified Stereo Speakers
- Stereo Headphones, Joystick
- 19 CD Titles (5 CD Discs)
- 14.4/14.4 Data/Fax Modem
- DOS 6.22, MS Windows for Workgroups 3.11, Microsoft Software Package
- Desktop Case w/7 Drive Bays
- 25 Professional Quality Monotype Fonts

Trial Subscriptions to America On-Line Prodigy and Compuserve with the purchase of any Flex System on this page.

The Flex 486 Multimedia Starter

From Only

$1149

- 486DX2-50 Processor • 4MB RAM
- 540 MB IDE Hard Drive • 1.44MB 3.5" Floppy Drive
- Double Speed CD-ROM Drive
- VLB Video Accelerator with 1MB RAM, 16.7M Colors
- 14" MultiScan Color Monitor, 1024x768i (35KHz Hor. Scan)
- VLB IDE-I/O with 2 Serial, Parallel, Game Port
- DOS • Windows • PFS WindowWorks • Mouse
- 6 CD Titles (on 2 CD Disks)
- Available in either a MiniTower Case with 5 Drive Bays or a Desktop Case with 7 Drive Bays
- 3 Year USA Flex Limited Warranty

Customize your Starter System by choosing one of these configurations to suit your needs!

Add 16bit Sound Card (Sound Blaster Compatible) and Amplified, AC Powered Stereo Speakers! **add $90**

Upgrade to 15" MultiScan Color Monitor, 28 dpi, 1280x1024i, 62KHz Hor. Scan! **add $140**

Upgrade system to 850MB Hard Drive and8MB RAM! **add $200**

Upgrade to 17" MultiScan Color Monitor 1024x768NI (48KHz Hor. Scan)! **add $240**

Upgrade system to 486DX-100 Processor ,128K L2 W/B Cache! **add $250**

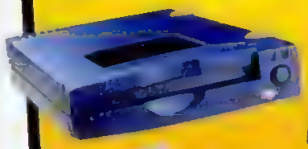
ORDER INFORMATION: No surcharge on credit cards. Maximum shipping and handling per order $6.95. MasterCard, Visa, Discover and American Express accepted for USA, Canada, APO, FPO and Puerto Rico. Flex Tech Card accepted for continuous USA only. A 5% service charge on credit orders for APO, FPO and Puerto Rico. C.O.D. orders under $500, add $5.00 (over $500, add $10.00) check warranty charge. For certified check C.O.D. orders over $1,000, please fax a copy of certified check to (708) 351-7204 for bank verification. APO/FPO add 5% to cover additional handling and insurance. CORPORATE/GOVERNMENT ORDERS: Corporations rated 1A1 or better and government agencies accepted on Net 30 terms with a valid purchase order. Leasing Plans available for qualified businesses only. RETURN PRODUCT INFORMATION: All returns must have prior authorization from our Customer Service Department at 800.95[illegible]488 or (708) 351-7731 Mon. - Fri. 7:30a.m. to 6p.m. & Sat. 9a.m. to 4p.m. (CT). All returns must be in original condition with original packaging, including all warranty cards and manuals. Product returns may be subject to a restocking charge. We will only accept unopened or pre-installed software for return. Software compatibility guaranteed only on pre-installed software included with your new Flex system. Thirty (30) day money back guarantee applies to Flex system only (does not include printer or other non-installed peripherals). We will not accept returns on toner printers if toner cartridge has been installed. All prices and specifications subject to change without notice. Not responsible for typographical or printing errors. All trademarks and registered trademarks are the property of their respective holders. Copyright 1995 USA Flex, Inc.

(708) 582-6206 • FAX (708) 351-7204
Government 1-800-723-2260
Education 1-800-944-5588
Government/Education FAX (708) 351-9871
Habla Espanol 1-800-723-5500 • (708) 582-6142

USA FLEX
OPEN 24 HOURS
MONDAY - FRIDAY
9 A.M. - 4 P.M.
SATURDAY & SUNDAY

Code # PM05A5

HOT!



19171

17691

20054

1705

18994

19352

19171 IOMEGA
Zip Drive-SCSI (parallel port avail.) **$199.95**

17691 IBM
OS/2 Warp Version 3-3.5" disks **$79.95**

20054 MACROMEDIA
Graphic Design Studio **$699.95**

1705 DELORME
Street Atlas USA CD-ROM **$74.95**

18994 NOVELL
Netware 4.1 CD-ROM 5 User **$649**

19352 SOFTKEY
One Stop CD-Shop **$29.95**

17040	Austin-Hayne Employee Appraisr	$89.95
16313	Borland Paradox 5—Windows	339.95
5785	CheckMark Payroll—Windows	79.95
13156	Clear Software allCLEAR—Win	179.95
17383	Envelope Manager DAZ-zle Plus	39.95
17007	Gold Disk Video Director—Win	99.95
14922	IdeaFisher—Windows	95.00
6733	Inspiration—Windows	129.95
2426	Intuit Quicken—DOS	42.95
3517	Intuit TurboTax—Windows	39.95
16536	Lotus Ami Pro 3.1 *(w $30 rebate)*	69.95
15978	Lotus Approach 3.0 *(w $20 rebate)*	79.00
19774	Microsoft Office for Win 4.2	479.95
17693	Microsoft Win NT 3.5 Wkstn	295.95
5743	Microsoft Win. for Wrkgrps 3.11	139.95
7811	Microsoft Word for Win 6.0	299.95
19400	MS Works—Win *(w free Money)*	87.95
14617	NEBS One Write Plus 4.5	49.95
5426	Shapeware Visio 3.0—Win	129.95
4402	Soft Pub Harvard Graphics—Win	279.95
10901	SoftKey A H D ctionary Talking CD	38.95
7435	Symantec ACT! 2.0 for Windows	189.95
12914	WordPerfect 6.1 for Windows	279.95
18240	WP Perfect Office 3.0	449.95

VIDEO

16899	Diamond Stealth 64	$369.95
17316	Magnavox 17" CM4017 Monitor	699.95
18412	Matrox Impression LITE VLB 2M	359.95
13054	NEC Multi Sync 2V 14" Monitor	329.95
17195	NEC MultiSync XE 15" Monitor	569.95

GRAPHICS

13109	Adobe Illustrator & Photoshop	$629.95
16661	Adobe Photoshop 3.0	569.95
13791	Aldus PageMaker 5.0	579.95
9943	Aldus Persuasion 3.0	324.95
7850	Corel Gallery CD ROM Windows	39.95
2616	Corel DRAW! 3.0 CD ROM	69.95
8498	Corel DRAW! 5.0 CD ROM	489.95
16961	Fractal Design Painter 3.0—Win	349.95
19880	HSC Conv aver Windows	129.95
13956	HSC KPT Windows	129.95
1085	Macromedia FreeHand Windows	399.95
10524	Micrografx ABC Flow Charter	329.95
17800	Micrografx Picture Publisher 5.0	279.95
6992	[illegible]	49.95

INPUT/OUTPUT

17310	[illegible]	$79.95
16889	HP DeskJet 540 Printer	299.00
16658	Microsoft Home Mouse	39.95
5187	Microtek ScanMaker II	479.00
16811	Polaroid SprintScan	1999.00
16151	UMAX BarCard Reader	199.95
16152	UMAX [illegible]	199.95

ACCESSORIES

3856	APC Back UPS 400 Power Backup	$149.95
9685	APC Professional Surge Protector	34.95
16891	Improvise Make it a 486	229.95
7899	Kensington Expert Mouse (Serial)	99.95
4623	PC Connection 3.5" Oak Disk Case	35.95
1305	Targus Universal Notebk Blk Case	69.95

GET PAPER INTO YOUR PC IN SECONDS!

$369 19656

In as little as 6 seconds fax, file or copy any piece of paper into your PC with the **Visioneer PaperPort**. Edit, copy or send pages without waiting to use the office copier. Installation is a snap, just connect to any serial port.

TAKE CONTROL!

Primavera's **SureTrak Project Manager** is the most useful project management software ever!

$279.95 19787

SureTrak allows for:

- scheduling and project modeling
- resource and cost management
- presentations, reports and graphics
- graphical user interface
- data exchange between files

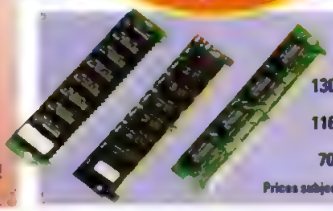
PRIMAVERA Take control of your project from start to finish!

We Carry Over 10,000 Products For Your PC and Mac!

CALL FOR A FREE CATALOG!

All at low discount prices!

Need Memory? Call us for the lowest prices around!



MAXIMIZE YOUR MEMORY!

13020	1MB x 3 SIMM (30 pin, 70ns, 3 chip)	$47.95
11673	2MB 512K x 36 SIMM (72 pin, 70ns)	99.95
7015	4MB 1MB x 36 SIMM (72 pin, 70ns)	199.95

Prices subject to change without notice due to market conditions.

OUR POLICY

- VISA, MASTERCARD, AMERICAN EXPRESS, and DISCOVER cards. No surcharge.
- Most of our products are covered by manufacturer's warranty
- We are not responsible for typographical errors

EVERYTHING OVERNIGHT

Continental U.S.: Shipping Charges $5 per order, please add an additional $10 for each desktop system, scanner, printer, monitor or power backup. Or you may elect FREE UPS Ground shipping on orders which include the hardware mentioned above. Barring events beyond our control, all credit card orders phoned in weekdays by 3 a.m. ET will ship Airborne Express for delivery the next business day. (Some orders ship UPS Ground for next day delivery). Saturday delivery available to many areas upon request at no additional charge. Order all day Saturday thru noon Sunday for Monday delivery. Some areas require an extra day delivery.

APO/FPO, International orders and Hawaii, Alaska, Canada, Puerto Rico & U.S. Virgin Islands: Shipping may require additional time and charges. Please call for information.

All other areas. Please call 603-446-0004 or FAX 603-446-7791 M-F 9 a.m.-5:30 p.m. ET

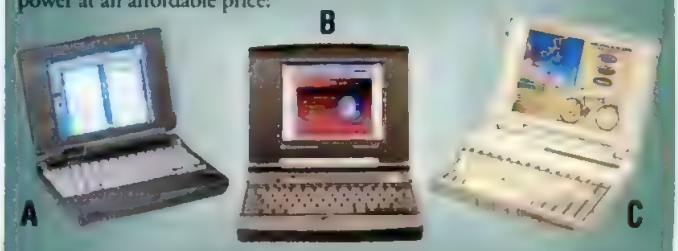
OPEN 24 HOURS A DAY!

Our order lines are open 24 hours a day, 7 days a week

595PCM

Notebooks for Everyone!

We have the Notebooks you need when it comes to performance and power at an affordable price!



A	15749	Compaq Aero 433C-170	$1499.
B	18697	Texas Instruments T4000M/50 DX2/340 Dual Scan Color	2139.
C	17950	Toshiba T4900CT/810 Pentium	5351.

©1995 PC Connection, Inc., Marlow, NH. The raccoon characters are registered trademarks of PC Connection, Inc. All other trademarks remain the property of their respective companies.

COMMUNICATIONS

2446	Delrina WinFax Pro 4.0	89.95
9976	MDS PC144B FaxModem	79.95
18894	Microcom DeskPorte FAST ES V.34	189.95
2322	Mustang QModem PRO—Win	69.95
2754	Norton-Lambert Close-Up Host/Rem	119.95
11143	Ocean Isle ReachOut Host/Viewer	129.95
4744	Practical Periph PM144MTII	119.95
7779	Server Tech Remote Power On/Off	119.95
19796	Spry Mosaic In A Box	39.95
17107	SupraExpress Plus 144i	94.95
11303	Symantec pcAnywhere 2.0–Win.	134.95
11924	US Robotics Sportster 14.4 Fax	119.95
13963	Zoom VFX 14.4V Voice FaxModem	149.95

NETWORKING

16926	Allied Telesyn 8Prt 10BASE-T Hub	$144.95
4470	Artisoft LANtastic 6.0 Starter Kit	239.00
18969	Cheyenne Sftwr ArcServe–3.5"	249.95
6508	Dataviz Conversions+ for Windows	89.95
12931	Novell Netware 3.12 5 User–3.5"	649.00
16655	Traveling Software LapLink for Win	139.95

UTILITIES

17608	Central Point More PC Tools—Win	$49.95
16440	Central Point XTree Gold—Win	99.95
3217	Quarterdeck QEMM 7.5	61.95
2360	Symantec Desktop—Windows	124.95
5136	Symantec Norton Utilities 8.0	124.95
10586	Symantec Norton 8.0 Vers Upgrade	47.95
19302	Vertisoft Remove-IT	34.95

MULTIMEDIA

19482	Altec Lansing ACS51	$79.95
3226	C. Labs Sound Blaster Pro Value Ed.	79.95
16428	Intel Smart Video Recorder PRO	429.95
17949	MDS Chinon 525 CD-ROM Drive	159.95
17936	MDS 4X 3501 CD-ROM Drive-Int	349.95
18516	Media Vision MV1100 Kit	229.95
18538	Media Vision Reno Portable Drive	299.95
17872	Plextor 4 Plex CD-ROM Drive-Int	449.95

EDUTAINMENT

17582	AITECH Wireless Bandit (joystick)	$59.95
6421	Grolier Encyclopedia	79.95
16419	Jasmine VidGrid	29.95
15140	Lucas Arts Rebel Assault	49.95
18284	MECC Oregon Trail II CD	49.95
7955	Microsoft Complete Baseball CD	39.95
17618	Microsoft Encarta '95 for Win CD	87.95
17448	Passport Design MusicTime 2.0	89.95
17348	WordPerfect Paper Planes	24.95
16622	WordPerfect Read w/ Me CD 1&2	49.95

STORAGE

18967	Conner 1.2GB IDE Drive	$449.95
16820	Iomega Bern. 230MB Transportable	499.95
19908	Iomega Ditto 420MB Tape Drive	159.95
16399	MDS 250MB Internal Tape Drive	129.95
18435	Olympus 230MB Optical Drive	999.95
18826	Quantum 540MB IDE Drive	259.95
17345	Western Digital 1GB IDE Drive	479.95

Order Now! Get next edition FREE!

PHONEBOOKS ON CD-ROM!

Select Phone from Pro CD allows you direct access to 80 million businesses and residential telephone listings, all on five CD-ROMs. Simply key in a name, address, a zip code, business heading—even an SIC code. *Click.* Up it pops!

$149.95 8047

IBM Business Partner

Meet APTIVA™

The Multimedia Solution for Your Family.

NEW!

It's the versatile, powerful, friendly multimedia home computer you always wanted! Every model arrives ready to run, complete with a 3.5" 1.44MB floppy drive, double speed CD-ROM drive, keyboard, mouse, 2 high-quality digital speakers, and pre-loaded software—plus room to grow. It's so easy. You'll feel right at home!

(Monitor not included.)

ONLY **$1399** 19810

19810	**Aptiva 338** 66-MHz 486DX2, 4MB RAM exp. to 64MB, 540MB Drive, 4 slots/4 bays, 2400 bps faxmodem, SoundBlaster 16, one pair 4 Watt speakers	$1399.
19957	**Aptiva 350** 66-MHz 486DX2, 4MB RAM exp. to 64MB, 540MB Drive, 8 slots/6 bays, (6 slots, 3 bays open), 2400 bps faxmodem, SoundBlaster 16, one pair 4 Watt speakers	1499.
19901	**Aptiva 535** 66-MHz 486DX2, 8MB RAM exp. to 128MB, 540MB Drive, 4 slots/4 bays, 14.4 Kbps faxmodem, Wavetable audio card, one pair 30 Watt speakers, voice recognition	1699.

PC Connection

800-800-0004

OR FAX YOUR ORDER 603-446-7791

ORDERS BY 3 A.M. ET SHIP FOR NEXT DAY DELIVERY!

CANON QUALITY—NEW LOW PRICE!

The new **Canon BJC-4000** offers superior resolution, high speed, and glorious color output. In black-only mode, it prints up to 5 ppm at 720 x 360 dpi resolution (360 x 360 dpi in color). It supports up to 16.7 million colors. And it features a switchable ink tank for low per page cost.

$399.95 16574

UPGRADES

7841	**Microsoft Word 6.0 for Win.** *(Version)*	$119.95
11336	**Microsoft Office for Win. 4.2**	$279.95
17954	**Symantec pcAnywhere Win. 4.2** *(Version)*	$59.95
18261	**WordPerfect Perfect Office 3.0** *(Version) (while supplies last)*	$189.95
17230	**WordPerfect Quattro Pro 6.0** *(Version)*	$49.95
12963	**WordPerfect 6.1 for Windows** *(Version)*	$92.95
8593	**CorelDRAW 5 – CD-ROM**	$189.95

IBM Business Partner

NEW!

ThinkPad 701C!

A Full-Sized Keyboard in a Pint-Sized Powerhouse!

"Sets the new notebook standard for others to match"
—PC Magazine 3/14/95

Weighing in at a mere 4.5 pounds, the IBM **ThinkPad 701C and 701CS** feature a full-sized 85-key **TrackWrite Keyboard** with the **TrackPoint III** pointing device. And you don't sacrifice an ounce of power or versatility.

Fully Equipped!

- PCMCIA slot
- 14.4K data/fax modem with voice and telephone
- 10.4" Color Display
- Local-bus video
- Pre-installed DOS, Windows, and mobile software

Ready for Multimedia!

- Sound Blaster-Pro support
- Built-in speaker and microphone
- Audio-in/out jacks for stereo
- External microphone connector

$4499 20167

20167	**IBM ThinkPad 701CS Dual-Scan Color** 50MHz, 360MB Drive	$4499.
20166	**IBM ThinkPad 701CS Dual-Scan Color** 50MHz, 540MB Drive	4849.
20168	**IBM ThinkPad 701C Active Color** 50MHz, 540MB Drive	5849.

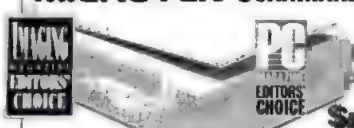
MIDWEST COMPUTER WORKS — YOUR COMPLETE

✔ Wide Selection ✔ Knowledgeable Sales Staff ✔ On-Time Delivery

YOU'RE OUR TOP PRIORITY!

If you're not happy, we're not happy. We have taken a vow to provide you with the best prices, service and selection possible.

MICROTEK ScanMaker IISP



New Lower Price...

$525

- Single Pass Scanning
- 1200dpi Resolution
- 24-bit Color & 8-bit Grayscale
- FREE Image Editing & OCR Software

Bundled with ImageStar II, OmniPage Direct and TWAIN module.
Optional DCR Color Calibration Correction software.

Polaroid

Digitize Your Slides In Under a Minute!!

This 35mm slide scanner lets you digitize images in under a minute. *Sprint Scan 35* captures 10-bits per color in optical resolutions up to 2700dpi & reduces post-scan image processing with real-time color processing. TWAIN driver scanning utility is included.

While Supplies Last! $1999

ViewSonic

See The Difference!™

$849

AWARD-WINNING 17" V17

Highly acclaimed 17" screen with *OnView™* controls. With powerful on-screen programming, the user can easily customize up to 20 image variations and functions. Some unique OnView controls are ViewMeter™, which displays frequency and refresh rate, and ViewMatch™ to adjust colors to match printer output.

- .27mm dot pitch
- 1600x1280ni Res.
- 135MHz Bandwidth
- ARAG® Coating

IDEAL FOR CAD/CAM & DESKTOP PUBLISHING - WHERE IMAGE QUALITY IS ESSENTIAL!!

Shown with optional VS127 Speakers.

TRIPP LITE Smart 500 UPS Battery Backup

Line interactive voltage regulation keeps you working through brownouts. Protects against blackouts, surges and line noise.

- 6 min. at Full Load
- 500volts/350watts

ULTIMATE LIFETIME INSURANCE

$279

24-Hour FAX Line 1-708-459-6933
International Line 1-708-459-6884
Customer Service 1-708-459-9410
Technical Support 1-708-459-9411

ORDER DEPARTMENT
1-800-859-6757

COMPUTERS

Factory Authorized Top Name Brands to Meet Your Desktop Needs!

Apple Power Mac ...Call for 8500 ...$49
Apple Power Mac 8100/100 8/700 ...3999
Wyse Terminals ...CALL FOR CURRENT PRICES

AST

Bravo MS 486DX266 270M 8M ...1449
Bravo MS Pentium75 540M ...1899
Bravo MS Pentium90 1GB ...2879

Canon

MT 4610 486DX2/66 420 CD ...1386
MT 7000 Pentium 75 850M Quad-CD ...1899
MT 9100 Pentium 90 1.2GB Quad-CD ...2499

COMPAQ

#1 Choice Authorized Service Center

Prolinea 4/33S 200M CD-ROM ...1179
Prolinea 4/66 420M ...1346
Prolinea Pentium-75 420M ...1899
Prolinea Pentium-90 420M CD-ROM ...2449
Prolinea Mini-towers ALL MODELS IN STOCK
DeskPro Pentium 100 1GB ...3969
DeskPro XE XL Series BEST PRICES AVAILABLE
PROLIANT BEST PRICES
PROSIGNIA Series BEST PRICES

PERFORMANCE NOTEBOOKS VALUE PRICED!

Apple PowerBook 150 4/120 ...1399
Apple PowerBook 540C 4/320 ...3299
Sharp PC8700/PC8900 ...2399/3699

AST

Ascentia 810N 4/66 340M 10.4" Pav Clr ...2499
Ascentia 910 4/75 510M 10.3" Pav Clr ...3049
Ascentia 910 4/75 510M 10.4" Act Clr ...3995

Canon

Notejet 486/33 200M w/printer ...1289
Notejet 486C/33 340M STN Clr w/print ...2029
Notejet DX2/50 340M STN Clr w/print ...2799
Notejet DX4/75 520M w/printer ...3499

COMPAQ

Contura AERO SX33 170M STN Clr ...1519
Contura AERO SX33 250M STN Clr ...1719
Contura 4/25CX 209M Active Clr ...2499
Contura 410C DX2/50 350M Passive Clr ...2379
Contura 410CX DX2/50 350M Active Clr ...2849
ELITE DX2/40 170M 4M Active Clr ...2699
ELITE DX2/50 340M 8M Active Clr ...4379
ELITE DX4/75CX 510M 8M Active Clr ...5099

IBM

ThinkPad 380CE DX2/50 340M TFT Clr ...2949
ThinkPad 380P 4/33 170M Pen Clr ...2829
ThinkPad 755C DX2/50 340M Activ Clr ...3699
ThinkPad 701CS DX2/50 540MB Clr ...3999
ThinkPad 755C DX4/75 540M Activ Clr ...4849

NEC

Versa V DX2/50 340M 4M Activ Clr ...2999
Versa M DX4/75C 340M 8M Activ Clr ...3849
Versa M DX4/100 340M 8M Activ Clr ...4199

IBM ThinkPad 755C

3 Year Warranty

$3699 340MB HDD

Preinstalled with DOS 6.3, Windows 3.11, Lotus Organizer, FaxWorks 3.0, America On-Line.

3-YEAR WARRANTY

TOSHIBA

$2479

Satellite Series T2400CS

9.5" Standard Color Display

T1910 SX 33 200M 4M Mono ...1299
T1910CS SX33 200M 4M STN Clr ...1724
T2100 DX2 50 320M 10.4" Clr ...CALL
T2400CDS DX4 75 500M CD ROM Clr ...CALL
T2400CS DX2/50 320M 4M STN Clr ...2479
T2450CT DX4/74 320M 8M Activ Clr ...3999
T3600CT DX2/50 250M 8M Activ Clr ...3448
T4850CT DX4/75 520M 8M Activ Clr ...4499
T4900CT Pentium75 772M 6M Activ Clr ...5499

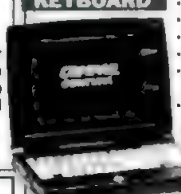
TEXAS INSTRUMENTS

TM4000M DX2/50 340M 4M Pav Clr ...2129
TM4000M DX2/50 455M 4M Activ Clr ...2629
TM4000M DX4/75 340M 4M Activ Clr ...3649
TM4000M DX4/75 455M 4M Pav Clr ...2799
TM4000M DX4/100 524M 4M Activ Clr ...4399
TM5000 Pentium/75 810M 8M Activ Clr ...5499

COMPAQ

NEW!! Contura 410C

FULL-SIZE KEYBOARD



- 486DX2/50C
- 9.5" STN Color
- 350MB HDD
- 4MB RAM, PCMCIA
- Local Bus Video
- 3.5 to 5.5 hrs. Battery
- 19mm Trackball

$2379

Now In Stock!

Canon Innova

- Intel 486DX2/66MHz
- 420MB HDD, 8MB RAM
- Dual-speed CD-ROM Drive
- 16-bit sound card & shielded speakers
- 14,400bps FAX/Modem w/ Voice Messaging
- 3.5", 1.44MB Floppy drive
- Local Bus Video with Windows Accelerator
- 256K Upgradable secondary cache (opt.)
- 6 drive bays (3 avail.), 4 exp. slots (2 avail.)

$1398

MULTIMEDIA MINI-TOWER

Pentium Upgradable

SOFTWARE INCLUDED

- DOS 6.22 & Windows 3.11
- FaxWorks Voice 3.0
- Sidekick
- SIM City 2000
- Compton's Interactive Encyclopedia
- Sierra Club Multimedia Guide
- Better Homes & Gardens Healthy Cooking
- Canon's Computer Glossary
- Royal Geographic Society
- Compuserve
- Claris Works
- Quicken SE
- AAA Trip Planner

** Monitor not included*

Innova Media Mini-Tower MT 4610

MONITORS

Top Rated Selection of Award-Winning Monitors at Unbeatable Prices!!

Amdek 432E 14" White VGA Monochrome...119
CTX 14" 1024x768ni .28mm ...225
CTX 14" 1024x768ni MPRII .28mm ...249
CTX 15" 1280x1024 MPRII .28mm ...319
CTX 17" 1280x1024ni .27mm Digital ...629
Goldstar 1455DL 14" 1024x768 .39mm ...199
Goldstar 1725 17" 1280x1024ni .28mm ...639
Magnavox CM2089 14" 1024x768 .28mm ...237
Magnavox CM2015 15" 1024x768ni .28mm .299
Magnavox CM4018 17" 1280x1024ni .28mm ...649
Mitsubishi Dmnd Pro17FS 17" 1280x1024 .28 ...899
Mitsubishi Dmnd Pro21TX 1600x1200 .30mm ...1899
Optiquest 2000 DC 15" 1280x1024 .27mm ...389
Optiquest 4000 DC 17" 1280x1024 .27mm ...679
Optiquest 4000 TC 17" Trinitron .25mm ...749
Samsung 17GLS 17" 1600x1280 .26mm ...879

iiyama

Award-Winning Selection!

MF-8115 15" 1280x1024 .28mm ...379
MF-8617A 17" 1280x1024 .26mm ...779
MF-8221 21" 1600x1200 .28mm ...1899
MF-8621 21" 1600x1200 .26mm ...2299
MF-9121 21" 1600x1200 .30mm ...1899

MAG

Mag DX15F1 1280x1024 .28mm ...339
Mag DX17F 17" 1280x1024ni .26mm ...619
Mag MXP17F 17" 1600x1280 .26mm ...899
Mag MX21F 21" 1600x1280 .28mm ...1699

NANAO

F2-15 15" .28mm 1280x1024 TCO ...539
F2-17 17" .28mm 1280x1024 ...849
F2-17EX 17" .26mm 1600x1200 TCO ...949
T2-17TS 17" .25mm 1600x1200 TCO ...988
T2-20 20" 30mm 1280x1024 TCO ...1963
F760IW 21" .28mm 1280x1024 ...1,999
FX2-21 21" .26mm 1600x1200 TCO ...2,770

NEC

XV14 14" 1024x768ni .28mm ...309
XV15 / XE15 ...429/539
XV17 / XE17 ...749/998
XE21 21" 1280x1024 .28mm ...1979

NOKIA

449E 15" 1280x768 .28mm ...459
447L 17" 1280x1024 .28mm ...694
447X 17" 1600x1200 .25mm ...1019
445X 21" 1600x1200 .25mm TCO ...2499

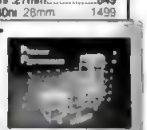
SONY

CPD1425 14" 1024x1068 .25mm ...319
CPD1SSF1 15" 1280x1024 .25mm ...427
CPD17SF1 17" 1280x1024 .25mm ...829
GDM 17SE1 17" 1600x1200 .25 mm ...979
GDM 20SE1 20" 1600x1200 .30mm ...1839

ViewSonic

V6E 14" 1024x768ni .28mm ...269
V15G 15" 1280X1024ni .28mm ...368
V17 17" 1600x1280ni .27mm ...849
V20PS 20" 1600x1280ni .28mm ...1499

SONY GDM-17se1 17" Trinitron Display



HARDWARE

BATTERY BACKUPS

APC

BK280B/BK400B/BK450 ...99/145/178
BK600/BK900/BK1250 ...239/345-449
AP400/AP500/AP900/AP920NET 279/334-489/539
AP1250 NET/AP2000 NET SmartUPS ...644/1025
Line-R 600 / 1250 UPS 220V ...119/169/CALL

TRIPP LITE

BC250/BC400 ...93/134
BC500/500 LAN ...168/179
BC600 LAN/750 LAN ...212/279
BC900 LAN/1250 LAN ...319/419
Smart 250-400 ...217/269
Smart 500/600 ...279/299
Smart 750/900 ...389/449

CONTROLLERS

Boca IDE 2-HDD 2-FDD IDE002 ...29
Boca IDE 2-HDD, 2-FDD 2-ser, 1-par ...49

adaptec

AHA-1522A Single SCSI-2 ISA ...75
AHA-1542 SCSI-2 ISA w/Flop ...195
AHA-2742 SCSI-2 EISA w/Flop ...295
AHA-2842 SCSI-2 VLB w/Flop ...239
AHA-2940 PCI SCSI Master ...289

CPU UPGRADES

Cyrix

386 to 486 CPU Upgrades and Math Chips .. CALL

intel

Overdrive for 486 16/20/25MHz to DX2/50 ...119
Overdrive for 486 33Mhz to DX2/66 ...185
Overdrive for 486 25Mhz to DX4/75 ...225
Overdrive for 486 33Mhz to DX4-100 ...295
Overdrive for 486 to Pentium 63MHz ...389

TAPE BACKUPS

Mountain Tape Drives BEST PRICES
Conner Tape Drives BEST PRICES

COLORADO

Jumbo 250/350/700/1400 ...152/169/269/355
Trakker 250/350/700 ...289/319/438
Powertape 1GB/ 2GB / 4GB int ...539/979/1199

SCANNERS

AGFA Scanners All Models ...CALL NOW!
Avec 2400 Designer ...479
Reisys 2412 w/Photoshop/Trans. ...779

HEWLETT PACKARD

ScanJet IIIP grayscale ...469
ScanJet IICX Color * w/ Rebate ...769*

MICROTEK

ScanMaker IIG B&W w/Omnipage Dir ...325
ScanMaker II Color 1200dp ...459
ScanMaker IISP Color w/ImageStar ...525
ScanMaker IIHR Hi-Res w/Picture Publisher ...799
ScanMaker III Ultra Hi-Res 36-Bit w/Photop...2369

Nikon

Cool Scan LS-10E PC int./ext. ...1199/1299
Scantouch AX-1200 flatbed ...Call for Color 1149

Polaroid

Sprint Scan 35 SCANNER ...1999

UMAX

Vista S6 600dp w/Photoshop LE ...829
UC1260 w/ Photoshop LE ...849
Powerlook LE 2400dp ...2399

PLOTTERS

Calcomp Designmate 3024S ...1449
HEWLETT PACKARD ...ALL MODELS
HP 220 D-size ...1999
Pacific Data Pro Tracer II ...999
Summagraphics ...ALL MODELS AVAILABLE

VIDEO BOARDS

Hercules Stingray 1MB PCI or VLB ...99
Hercules Dynamite & Graphite series Best Prices
Matrox Impression Lite 2MB VLB or PCI ...309
Matrox Impression Plus 2MB PCI/ISA ...379/419
Number 9 GXE64 PCI or VLB 1MB/2MB ...179/249
Number 9 GXE64Pro PCI or VLB 2MB/4MB ...538/609
Orchid Fahrenheit & Kelvin series Best Prices

ATI

Graphics Wonder Mach32 1M ISA/VLB ...119
Graphics Ultra+ 2M ISA ...199
Graphics XPression VLB/PCI/ISA 1MB/2MB 152/209
Graphics Ultra Pro 2M VLB/PCI/ISA ...269
WinTurbo 2M VLB/PCI/ISA ...269
Graphics Pro Turbo 2M VLB/PCI ...369
Graphics Pro Turbo 4M VLB/PCI ...569

DIAMOND

Speedstar Pro PCI & VLB, 1MB/2MB ...105/165
Speedstar 64 ISA 1M/2M ...149/197
Stealth 64 DRAM 1M/2M w/Corel ...147/197
Stealth 64 VRAM 2M VLB/PCI w/Corel ...319
Stealth 64 VRAM 4M VLB/PCI w/Corel ...469
Viper SE VLB or PCI 2M / 4M ...319/475

DIGITIZERS

Calcomp Drawing Slate 12x12 16bit ...239
Kurta 6x8 XGT w/interface ...239
Summasketch III 12x12 any cursor ...269
Wacom Artpad 4x5 w/ Dabbler ...189

HIGH RESOLUTION!

- 1600x1200 Resolution @ 60Hz Refresh Rate
- .25mm Aperture Grille Pitch
- Digital Microprocessor Control

$979

MODEMS

Boca Modem 14.4 w/Fax int. w/software ...83
Boca 14.4 Multimedia Voice Modem ...128
Boca 28.8 V 34 int./ext. ...174/213
Microcom TravelCard & Deskporte.ati models ...CALL
Multitech 1932ZDX 19.2 w/fax ext. ...135
Multitech 2834ZDX 28.8 w/fax ext. ...198
Practical 14.4 Mini-Tower ext. ...107
Practical 28.8 V 34 w/fax int. / ext. ...195/215
Telebit FastBlazer & NetBlazer series ...CALL
Telebit QBlazer, TrailBlazer & WorldBlazer ...CALL
Zoom 14.4 w/Fax int./ext. ...71/95
Zoom Pkt. 14.4 Pocket ...189

Hayes

Accura 28.8 w/fax int. / ext. V.34 ...189/219
Optima 28.8 w/fax int. / ext. ...369/429
Optima 28.8 EZJack PCMCIA ...349

Megahertz

XJ144 xJack 14.4 PCMCIA ...175
XJ2288 xJack 28.8 PCMCIA V.34 ...348
EM1144T 14.4 PCMCIA 10BT Combo ...399

U.S. Robotics

Sportster 14.4 w/fax int./ext. ...97/112
Sportster 28.8 V 34 int. ...224
Sportster 28.8 V 34 ext. ...239
Sportster PCMCIA 2.1 14.4 w/fax ...179
Sportster PCMCIA 2.1 28.8 w/fax V.34 ...349

Policy Information

• Personal and company checks will delay orders 2 weeks • No extra charge for credit cards • All prices subject to change • For orders outside the USA we require payment by wire transfer or American Express credit card • We check for stolen credit cards • All returns for credit, repair or exchange must have a return authorization number issued by our customer service department • All returned merchandise must be shipped to our main warehouse located at: 180 Lexington Drive, Bolingbrook, IL 60440

Easy Payment Methods!

• Leasing Available • Purchase orders accepted from educational institutions, federal & state agencies and approved corporations. • C.O.D.'s welcome.

DHL FedEx

FAST SHIPPING, NO PROBLEM! WE DELIVER WHEN YOU NEED IT.

PCMDM MAY 15 '95

COMPUTER SOURCE!!!

✓ Top Name Brands ✓ Quality Products ✓ Comprehensive Tech Support

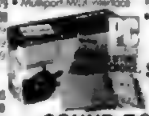
Call for a FREE Catalog!

MULTIMEDIA

MULTIMEDIA KITS

Turtle Beach MultiSound Monterey

- Audiophile Quality Sound
- Software Upgradability
- Multiport MIDI Interface
- Configurable Sample RAM
- Effects Processor
- 32 Voices w/ 16-bit Sound



$329

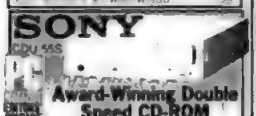
SOUND BOARDS

VIDEO CAPTURE

PC SPEAKERS

SONY

YAMAHA



Award-Winning Double Speed CD-ROM

- 256K Data Buffer
- SCSI-2 Interface
- 300K/sec Data Transfer Rate
- 4MB/sec Burst Transfer Rate
- 220ms Random Access Speed

$154

PRINTERS

HEWLETT PACKARD 4+

Effectively doubles printer memory for full page graphics and downloaded fonts!

- 600dpi Print Resolution
- 12ppm with 2MB max. 6MB memory
- HP Bi-Tronics parallel/serial interface
- 250-sheet paper tray
- One Year Warranty

Enhanced HP PCL 5 with 45 scalable typefaces; optional Adobe™ Level 2 SIMM with 35 Adobe Type 1 typefaces!

$1399

LaserJet 4+ Printer

Accessories In Stock!

Canon

CITIZEN

EPSON

LEXMARK

TEXAS INSTRUMENTS

OKIDATA

Panasonic

QMS

SII

Canon Color BubbleJet

- 360dpi Color
- 170 cps - LQ Mode
- Legal Size
- 4 Individual Color Cartridge
- Color Advisor Software

$459

DRIVES

CD-ROM DRIVES

OPTICAL DRIVES

HARD & FLOPPY DRIVES

MICROPOLIS

PINNACLE MICRO

Seagate

CONNER

SOFTWARE

DESIGNCAD 2D for Windows!

$162

- 500 Symbols, dimensioning
- Supports 7 file formats
- Scaling zoom & layers
- Material list & editing toolboxes
- Dos version available

PC EDITORS' CHOICE

NETWORKING

NATIONAL SEMICONDUCTOR

NOVELL

FREE SHIPPING WITH ALL NOVELL NETWARE UPGRADES!

PACIFIC DATA PRODUCTS

SMC

ARTISOFT

ALL MODELS IN STOCK.....CALL TODAY!

THOMAS-CONRAD CORPORATION

Xircom

LINKSYS

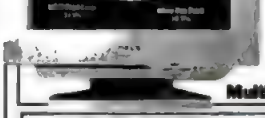
NOVELL UPGRADE TO NETWARE 4.1

From Any Version	5-User	10-User	25-User	50-User
5-User License	$295	$1,149	$1,889	
10-User License		$579	$1,335	$2,125
25-User License			$889	$1,689
50-User License				$1,169

Call for upgrades to 100, 250, 500 and 1000 users!

15" SONY Trinitron CRT Display Technology

3 Yr. warranty



- .25mm Aperture Grille Pitch
- Max. Resolution 1280x1024 at 60Hz
- Full Compliance with MPRII & Energy Star

Distinctive styling with easy-to-use digital controls and color temperature.

Multiscan 15sf $427

FARGO DUAL DYE-SUBLIMATION/WAX THERMAL TRANSFER PRINTING

PrimeraPro Color Printer

Photo-Realistic Color Printing! Finally one printer does it all.

- 600x300dpi Print Resolution
- Multi-Platform Compatibility
- LocalTalk, Ethernet or Parallel Interface
- Optional Adobe Postscript Level 2
- Letter/Legal Paper Size
- One Year Warranty

$1339

We Stock All Supplies!

MIDWEST COMPUTER WORKS
180 Lexington Drive, Buffalo Grove, IL 60089

NATIONAL DIRECT ORDER LINE

1-800-85-WORKS

(1-800-859-6757)

FAX 1-708-459-6933

Customer Service 1-708-459-9410

CIRCLE 010 ON READER SERVICE CARD

Arlington Computer Took a Long Term Business Perspective but Used PC Magazine for Immediate Results.

Arly Guenther
President, Arlington Computer

When Arly Guenther started Arlington Computer, he decided to take a long term approach by taking care of his customers so they would come back and become repeat buyers. According to Arly, this long term approach pervades everything they do — customer service, technical support, and advertising.

"When we started the company in early 1984," says Arly, "we believed that our success as a direct marketer would be tied to customer satisfaction. So we attempted to go into the direct advertising arena. Our strategy was to sell branded products at competitive prices while continually responding to the changing needs of our customer base. Two or three years ago, people might wait two or three weeks for a product. Now they want it overnight, and they want much more sophisticated technical support. After ten years of being in business, we really feel that our support is among the best in the industry."

When Arly chose the direct marketing channel, he knew the best way to maximize the return on his investment was to target business buyers that have enterprise-wide buying responsibility and buy many products in volume. He selected PC Magazine back in 1986 because its readers have the knowledge and responsibility to buy products for themselves and their organizations. In fact, because of the large volume buying, "PC Magazine has become Arlington's flagship publication, because its buyers buy many different types of products resulting in high average order sizes. All of this brings more revenue to the bottom line, and has allowed Arlington to grow to its present size."

"If you're in direct marketing for the long term, PC Magazine is an excellent choice. We run ads in PC Magazine consistently and have not missed an issue since day one." As a result, "last year alone our sales from PC Magazine were up over 30%." So, if you want your advertising message to reach the broadest, most sophisticated customer base, PC Magazine is definitely the place to be.

If you're a direct marketer with a breakthrough idea, bring it to the attention of 1,000,000 of the most active and knowledgeable PC buyers. Call your PC Magazine sales representative or (212) 503-5100 and get the facts about PC Direct.

PC DIRECT

FOSA

the leading notebook technology

Introducing

The world's fastest notebook computer & largest color display

Best performance!

Best price!

AP 3500

- Intel 486DX4-75 MHz CPU.
- 4MB RAM expandable to 20MB.
- 11.3" Dual Scan (10.4" Active Matrix Option).
- VL bus Graphic Accelerator with 1MB VRAM.
- Two PCMCIA type II or one type III Slots.
- Removable 340MB Hard Drive (520, 810MB Option).
- 3.5" 1.44 MB Micro Floppy Drive, replacable with Secondary Battery Pack.
- 16-bit Stereo Audio Card, Mic. and Speaker.
- Mic-in, Speaker-out,, and Volume control .
- 86-key membrance type Keyboard.
- Track Point integrated compliant, PS/2 interface.
- Built-in Intelligent Power Manager (IPM).
- One 16C550 high speed Serial Port and one Parallel Port with ECP/EPP.
- Ports for Ext. keyboard, Ext. Monitor & 200 Pin connector for Docking Station.
- Carrying Bag & A/C Adapter.
- MS DOS 6.22 .
- 5.8 lbs (with Battery), 11.7"W x 9.6"D x 1.65"H.

AP 3500
11.3" Display
$ 1999

AP 7600
Pentium 75
$ 2545

AP 7600

- Intel Pentium-75 MHz CPU (3.3V).
- VL bus Graphic Accelerator with 1MB VRAM.
- Two PCMCIA type II or one type III Slots.
- 8MB RAM expandable to 40MB.
- 256 KB Secondary Cache Memory.
- Removable 520 MB Hard Drive (810MB Option), local bus IDE interface.
- 3.5" 1.44 MB Floppy Drive.
- 16-bit Stereo Audio Card, Mic. and Speaker.
- 10.3" Dual Scan (10.4" Active Matrix Option).
- Built-in Trackball.
- Built-in Intelligent Power Manager (IPM).
- One 16C550 high speed Serial Port & one Parallel Port with ECP/EPP.
- Ports for Ext. keyboard, Ext. Monitor & 200 Pin Connector for Docking Station.
- Carrying Bag & A/C Adapter.
- MS DOS 6.22 .
- 6.4 lbs (with Battery), 11"W x 9.0"D x 1.9"H.

For information & prices of other models, CALL !!!

Technical Support: One year Parts
, 30-Day Money Back Guarantee
are not refundable.)

VISA MasterCard Card

FOSA Computer Inc.

1-800-216-3672

TEL: 908-753-6100 FAX: 908-753-6616

400 Corporate Court, #D, South Plainfield, NJ 07080

Hours: Mon-Fri. 9AM-6Pm; Sat. 9AM-3PM

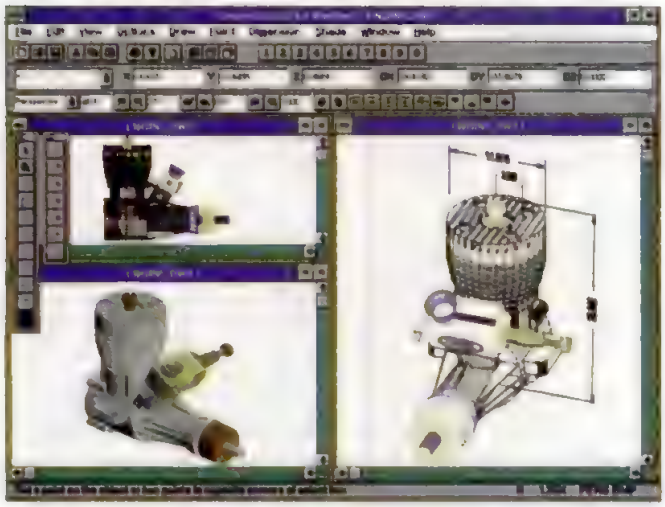
FOSA Computer Inc. All right reserved. All company and/or product names mentioned herein are trademarks and/or registered trademarks of their respective companies. Price and specification are subject to change without notice

CIRCLE 089 ON READER SERVICE CARD

Add A New Dimension To Your Life With

DesignCAD 3D

DesignCAD 3D for Windows! Now *you* can create virtually any 3-dimensional model for engineering, architectural, and other design applications.



DesignCAD 3D is Powerful!
Superior geometric construction • Distance, area, volume, and other calculations • 3-D keyframe animation • Realistic smooth shading with textures • Hidden line removal • Macro capability and programming language • Solid modeling operations such as solid subtraction, intersection, union, and interference checking • Curved surface construction normally available only in systems costing ten times as much!

DesignCAD 3D is Flexible!
OLE 2 and clipboard support • Macro and Basic programming languages • Customizable toolboxes • File compatibility with DXF, IGES, HPGL, Metafile, and more • 3D dimensioning and text with TrueType font support.

DesignCAD 3D is Easy!
Extensive on-line help • Excellent manual • Free tutorial • Quick edit boxes • Simple, easy-to-use commands • Multiple views and multiple drawings • *Free technical support!*

DesignCAD 3D is Priced Right!
With a suggested retail price of $495, DesignCAD is available on the street at a price you can afford. And you won't need a special computer -- DesignCAD runs under Windows 3.1 or later and requires only 4 megabytes of RAM. DesignCAD supports any printer, plotter, and video card supported by Windows, and it requires only 5 megabytes of hard drive space.

Solid Modeling!
Advanced solid modeling makes it easy for you to drill, slice, mold and sculpt to any shape! You can also find the volume and surface area!

Easy To Use!
DesignCAD 3D is extremely easy to use, and along with the excellent manual, on-line help, and a tutorial, we offer free technical support!

Realistic Shading!
You can display and print realistic images of your drawings with DesignCAD's smooth shading and textures!

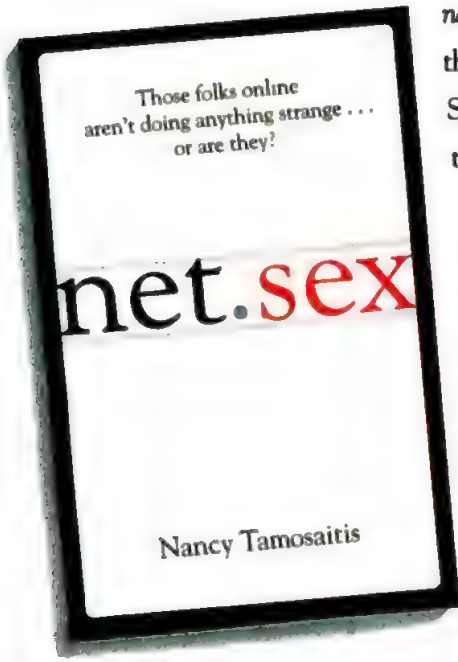
See your local dealer or call:

American Small Business Computers
One American Way, Pryor, OK 74361

phone (918) 825-7555
fax: (918) 825-6359

CIRCLE 025 ON READER SERVICE CARD

SEX IN AMERICA . . .



net.sex provides a ground-breaking investigation of sex-related topics on the Internet, and includes the results of the Kinsey Institutes's National Sex Knowledge Test, conducted completely online and professionally tabulated and analyzed.

ONLINE

Tamosaitis presents the facts and lets her readers draw informed conclusions. It doesn't matter whether you are interested in joining the adult online community, or in keeping your children away from it, *net.sex* is a fascinating read.

$22.95 ISBN: 1-56276-285-0

Available at fine bookstores or call
1-800-688-0448, ext. 314.

ZIFF DAVIS ZD PRESS

© 1995 Ziff-Davis Press

IBM NEC SHARP ZENITH TOSHIBA EPSON hp

Florida's Largest Authorized Dealer For Notebook Computers

YOUR DIRECT SOURCE

Price Availability Delivery

ALL MODELS IN STOCK!

CALL FOR BEST PRICE!

TOSHIBA

T3600 Portege NEW
AUTHORIZED DEALER
- T3600 CT 8/500 ..... $3727

T1910/T1960CT
Call For Closeout Pricing

Call For New 2100 & 2150 Series
- T2100 DX50 4/260 Mono $1429
- T2100 DX50 4/350 Dual $2225
- T2100 DX50 8/350 Active $3065
- T2150 DX75 4/500 W/CD ROM Dual .. $3569
- T2150 DX75 8/500 W/CD ROM Act .. $4659

T4800CT/T4900CT
AUTHORIZED DEALER
- T4800CT 8/510 Active Color ..$4155 CALL
- T4850CT 8/510 Active Color $4489
- T4850CT 8/810 Active $4785
- T4900CT 8/810 PENTIUM $5499

T2400 SERIES DX/50
FREE Carrying Case While Quantities Last
- T2400CS 4/250 DUAL $2269
- T2400CS 4/320 DUAL $2439
- T2400CT 8/250 ACTIVE $2929
- T2400CT 8/320 ACTIVE $2999
- T2450CT 486DX75 8/320 ..... $3949
- T2450CT 486DX75 8/500 ..... $4239

EPSON

Hot New Notebooks
- 650 DX50 4/260 Mono $1315
- 650C DX50 4/260 Dual $1759
- 866C DX66 4/340 Dual $2259
- 880C DX80 8/340 Dual $2710
- 880CX DX80 8/340 Active $3780

- STYLUS COLOR $479
- ACTION LASER 1100 ..... $369
- ACTION LASER 1400 ..... $565
- ACTION LASER 1500 ..... $445
- ACTION LASER 1600 ..... $740
- LX 300 ..... $160
- LQ 300 ..... $185
- LQ 570+ $239
- LQ 870 ..... $440
- LQ 1070+ $359
- LQ 1170 ..... $605
- FX 870 ..... $279
- FX 1170 ..... $365
- DFX 5000+ $1350
- DFX 8000 ..... $2279

NEC

NEW VERSA SERIES AUTHORIZED DEALER

NEC VERSA S
- 486 SLD33 210 ACTIVE $2115
- 486 DX50 260 ACTIVE $2299
- 486 DX50 350 ACTIVE $2479

NEC VERSA P
- P/75C DX75 8/340 ACTIVE $4595
- P/75C DX75 8/540 ACTIVE $4960
- P/75C DX75 8/810 ACTIVE $5455
- P/75HC DX75 8/540 High Resolution $5529
- P/75HC DX75 8/810 High Resolution $5825

NEC VERSA M
- M/75D DX75 8/250 DUAL $2959
- M/75D DX75 8/340 DUAL $3120
- M/75C DX75 8/340 ACTIVE $3719
- M/75C DX75 8/540 ACTIVE $4089
- M/75CP DX75 8/340 ACTIVE W/Pen $4179
- M/100C DX100 8/340 ACTIVE $4045
- M/100C DX100 8/810 ACTIVE $4899
- M/75TC DX75 8/340 TRUE COLOR $3995
- M/100TC DX100 8/540 TRUE COLOR .. $4685
- M/75HC DX75 8/540 HIGH RES $4455
- M/100HC DX100 8/540 HIGH RES $4775
- M/100HC DX100 8/810 HIGH RES $5275

IBM

THINKPAD 360
- CSE DX 50, 4/340 DUAL $2549
- CSE DX 50, 4/540 DUAL $2879
- CE DX 50, 4/340 ACTIVE $2935
- CE DX 50, 4/540 ACTIVE $3255

THINKPAD 755
- CE DX 100 8/340 ..... $5425
- CE DX 100 8/540 ..... $5769
- CE DX 100 8/810 ..... $6199
- CSE DX 100 8/340 ..... $4455
- CSE DX 100 8/540 ..... $4795
- CSE DX 100 8/810 ..... $5235
- CD DX 100 8/540 ..... CALL
- CD DX 100 8/810 ..... CALL
- 51H CS SL50 4/200 DUAL $1699

CALL FOR NEW 701C 486DX2/50, 8/540 TFT, 701C 486DX2/50, 8/720 TFT

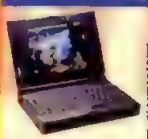
Texas Instruments

MULTI MEDIA TRAVELMATE™ 5000
- TM 5000 DX4/75 8/524 Dual ..... CALL
- TM 5000 DX4/75 8/810 Active ..... CALL

MULTI MEDIA TRAVELMATE™ 4000M
- DX 50 4/340 DUAL $2515
- DX 50 4/455 ACTIVE $3185
- DX 75 4/340 ACTIVE $3020
- DX 75 4/455 DUAL $3350
- DX 75 4/455 ACTIVE $4189
- DX 100 4/524 ACTIVE $4709

ZENITH DATA SYSTEMS

- Z-STAR EX 486DX2 50MHz, 4/200, MONO $1675
- Z-STAR EX 486DX2 50MHz, 8/200, MONO $1919
- Z-STAR EX 486DX2 50MHz, 4/200, DUAL SCAN $2090
- Z-STAR EX 486DX2 50MHz, 8/340, DUAL SCAN $2415
- Z-STAR EX 486DX2 50MHz, 4/340, ACTIVE MATRIX $3020
- Z-STAR EX 486DX2 50MHz, 8/340, ACTIVE MATRIX $3299



Z-Noteflex Bundles

Package 1: Intel DX2/50, 4/200, Active, Megahertz PCMCIA 14.4 X-Jack Modem, Software includes: PC Tools for Windows, CommWorks Windows, & CoSession Remote Software $1559

Package 2: Intel DX2/50, 8/340, Active, Megahertz PCMCIA 14.4 X-Jack Modem, Software includes: MS Office pre-installed, PC Tools for Windows, CommWorks for Windows, & CoSession Remote Software $2199

Package 3: Intel DX4/75, 8/520, Active, Megahertz PCMCIA 14.4 X-Jack Modem, Software includes: MS Office pre-installed, PC Tools for Windows, CommWorks for Windows, & CoSession Remote Software $2999

Z-PLAYER Portable CD-ROM Presentation Unit
- Double Speed CD ROM
- 300KB/Sec data transfer
- On Board Speakers W/16-bit stereo sound
- Audio Input/Output Jacks
- PCMCIA Card and Cable
- Built-in Microphone

$469

OKIDATA

OL400e $399
Print Speed: 4ppm w/RISC microprocessor
Print Quality: 300 DPI
Print Resolution: 300 DPI
Standard RAM: 512 K Bytes w/Enhanced Memory
Max RAM: 4.5 M Bytes
Compatability: HP LaserJet IIp+

OL410e $459
Print Speed: 4ppm w/RISC microprocessor
Print Quality: 600 DPI class output
Print Resolution: 600 DPI w/OK1600 print mode
Standard RAM: 2 M Bytes w/Enhanced Memory
Max RAM: 5 M Bytes
Compatability: HP LaserJet III

SMART

ST 1414CI Fax Modem (For Cellular) ..... CALL
28.8 kbps V.34/Vfast Fax Modem ..CALL
ST 1414L Fax & Voice ..... CALL

Megahertz

Call For Latest Prices!
PCMCIA Ethernet Modems ..... CALL
28,000bps PCMCIA modems (XJ2288 & CC3288) ..... CALL
The XJACK® PCMCIA connectors ..... CALL

SHARP

SHARP PC-8700
1486 DX2/50 4/250, 8.4" ACTIVE MATRIX, 32-BIT GRAPHICS ACCELERATED VESA LOCAL BUS VIDEO W/1MB VRAM, 16-BIT STEREO, BUILT-IN STEREO SPEAKERS AND MICROPHONE, GLIDEPOINT TRACKPAD, 1 44MB, REMOVABLE FLOPPY DRIVE FOR SECOND BATTERY, 1 TYPE III OR 2 TYPE II PCMCIA, MS-DOS, WINDOWS, ONLINE MANUAL, AMERICA ONLINE, COMPUSERVE, CHECKFREE, NIMH "SMART" BATTERY/3-4 HOURS, 6-8 HOURS W/2ND BATTERY OPTIONS MINI-DOCK, PCMCIA TYPE III AND TYPE II SLOTS PORTS, SCSI-2, MIDI/GAME, SERIAL, PARALLEL, SVGA, PS/2 KEYBOARD, PS/2 MOUSE, STEREO-OUT 1-YR WARRANTY

$2325

SHARP PC-8900
1486 DX4/75, 8/320, 10.4" ACTIVE MATRIX, 32-BIT GRAPHICS ACCELERATED VESA LOCAL BUS VIDEO W/1MB VRAM, 16-BIT STEREO, BUILT IN STEREO SPEAKERS AND MICROPHONE, GLIDEPOINT TRACKPAD, 1 44MB, REMOVABLE FLOPPY DRIVE FOR SECOND BATTERY, 1 TYPE III OR 2 TYPE II PCMCIA, MS-DOS, WINDOWS, ONLINE MANUAL, AMERICA ONLINE, COMPUSERVE, CHECKFREE, NIMH "SMART" BATTERY/3-4 HOURS, 6-8 HOURS W/2ND BATTERY OPTIONS MINI-DOCK, PCMCIA TYPE III AND TYPE II SLOTS PORTS, SCSI-2, MIDI/GAME, SERIAL, PARALLEL, SVGA, PS/2 KEYBOARD, PS/2 MOUSE, STEREO-OUT 3-YR WARRANTY.

$3480

AST

ASCENTIA AUTHORIZED DEALER
- 810 N 486DX 66, 4/250 DUAL $2319
- 810 N 486DX 66, 4/340 DUAL $2459
- 810 N 486DX 66, 4/510 DUAL $2595
- 910 N 486DX 50, 8/340 DUAL $2595
- 910 N 486DX 75, 8/510 DUAL .. $2969
- 910 N 486DX 75, 8/510 ACTIVE .. $3895
- 910 N 486DX 75, 8/700 ACTIVE .. $4269

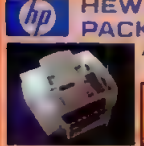
HIGH END NETWORK SERVERS

NEC AST IBM ZENITH
- AST Manhattan P, ECC,16 MB, P/90, 1GB ..$5878
- NEC RISC, 150Mhz, SMP, 64RAM,1GB $9560
- DIGITAL XL Server, Pentium 66, 1GB, ... $8095
- IBM Model 95, P/66, 16MB RAM,1GB , ECC ..$7575

OVERNIGHT DELIVERY AVAILABLE

HEWLETT PACKARD

Authorized Dealer



- HP 4L $495
- HP4P $929
- HP 4ML $975
- HP 4MP $1310
- HP4M Plus $1879
- HP 4 Plus $1395
- HP 4 V $1859
- HP 4 MV $2690
- HP 5P NEW ..... CALL
- HP 5MP NEW ..... CALL
- HP 4SI $2849
- HP 4SIMX $4019
- HP DeskJet 320 ..... $285
- HP 540 ..... $279
- HP 560C $455
- HP 1200C $945
- HP 1200CPS $1515
- HP Scanjet 2CX $895
- HP Scanjet3P $455
- HP Scanjet3C ..... CALL
- HP OfficeJet, Printer, Fax & Copier $725
- HP 200LX 1MB $489
- HP 200LX 2MB $605
- HP 600 DX 50, 4/170 ..... $2469
- HP 600 DX 50, 4/260 ..... $2729
- HP 600 DX 75, 8/170 ..... $2999
- HP 600 DX 75, 8/260 ..... $3265
- HP 4000 486 DX50 4/260 Dual ... $2439
- HP 4000 486 DX50 8/340 Dual ... $2739
- HP 4000 486 DX50 8/520 Dual ... $3099
- HP 4000 486 DX50 8/340 Active.. $3650
- HP 4000 486 DX50 8/520 Active .. $3999
- HP 4000 486 DX100 8/340 Dual ... $3500
- HP 4000 486 DX100 8/520 Dual ... $3870
- HP 4000 486 DX100 8/340 Active . $4345
- HP 4000 486 DX100 8/520 Active . $4675

SUNSHINE COMPUTERS

A Division Of INNOVATION COMPUTERS

1-800-413-5854

WHEN IN FLORIDA VISIT OUR 5000 SQ.FT. SHOWROOM

A division of Innovation Computers

22191 POWERLINE RD., SUITE 14B; BOCA RATON, FL 33433

FOR TECH SUPPORT & CUSTOMER SERVICE: (407) 394-3742
FAX YOUR ORDER: (407) 750-4261
OUTSIDE USA: (407) 394-4180 • INTERNET: sergio@gate.net

• HOURS: MON-FRI 7AM TO 8PM E.S.T. • SAT: 10AM - 6PM E.S.T. • SUN:12-5PM E.S.T.
• WE ACCEPT VISA, MASTERCARD, DISCOVER & AMERICAN EXPRESS
• NO CREDIT CARD SURCHARGE
• COMPANY & GOVERNMENT PURCHASE ORDERS WELCOME
• TECH HOURS: MON-FRI 9-6 • SAT:10-4

Attention: Due To On-Going Price Updates of Notebook & Laptop Computers... CALL For Current Pricing and Availability

THE FOLLOWING ALSO APPLIES:
• All items are carry at least a one year warranty • 10 day return policy • All items returned must include original packaging and documentation • No returns without RMA number • Shipping and handling are non-refundable • All returns subject to a re-stocking fee • Not responsible for typographical or printing errors • Software not returnable • Laser printers not returnable

PCMC

Introducing the CD whole new spin on PC MAGAZINE CD.

You've never seen anything like it!

It's one thing to read about cutting-edge technology. It's another thing to plug right into it. Interact with it. Download it onto your system and play with it. That's exactly what PC Magazine CD lets you do — and more.

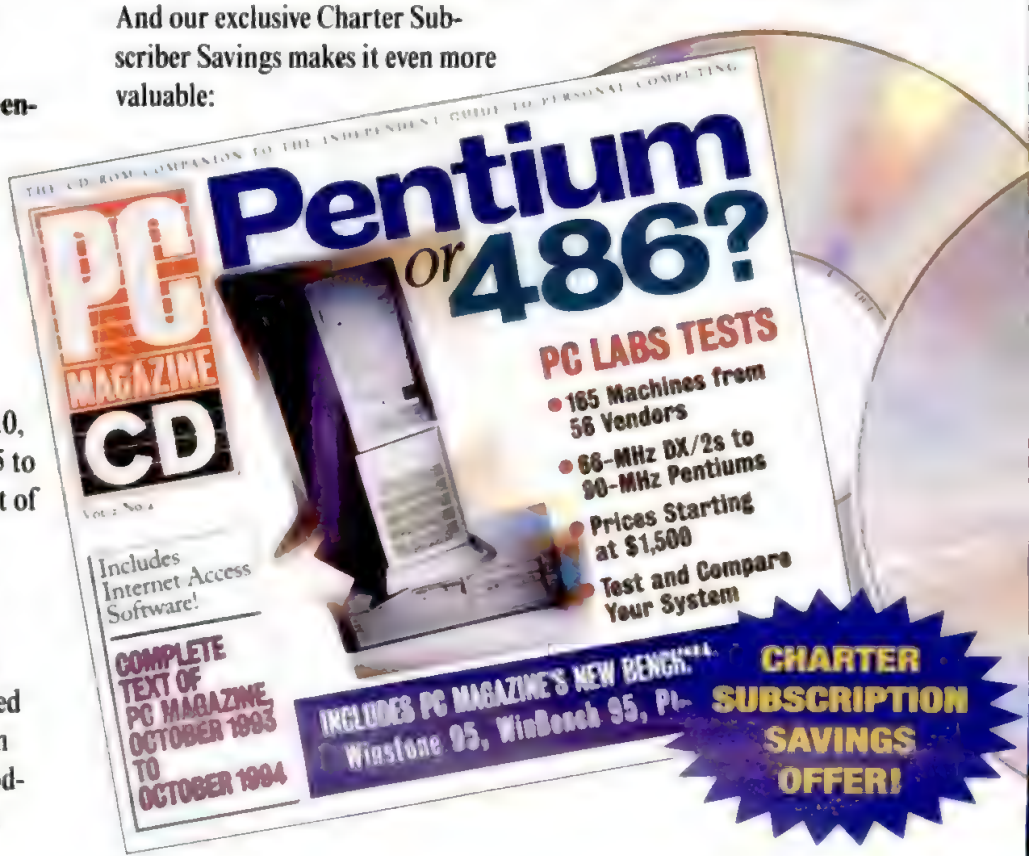
This interactive companion to your printed PC Magazine is the first and only computer information resource of its kind. With just a click you can:

- **Walk through multmedia Screen-Demos** that bring our Cover Stories to life. Hear and see your favorite PC Magazine editors discuss the pros and cons of the entire competitive line-up.
- **Put your system through its paces.** Download PC Bench 9.0, WinBench 95 and Winstone 95 to chart and compare every aspect of your PC's performance.
- **Get working samples of real applications to run on your system** — unique multimedia product presentations developed exclusively for this CD! You can even take a "First Look" at products *before* they hit the market.
- **Access the full text of every article that appeared in PC Magazine** for the past 12 months — including every utility, file, tip, shortcut and patch we've published. Dynamic "super searching" software lets you find what you need instantly.

It's a powerful tool that enhances the help you get from PC Magazine. And our exclusive Charter Subscriber Savings makes it even more valuable:

For only a limited time, you can get four power-packed releases of PC Magazine CD for just $49.95 — and **save 30%** off the single-disc price. Or you can order the next available quarterly release for only $17.95.

But you must hurry because supplies are limited. Call now to get the next disc rushed right to you!

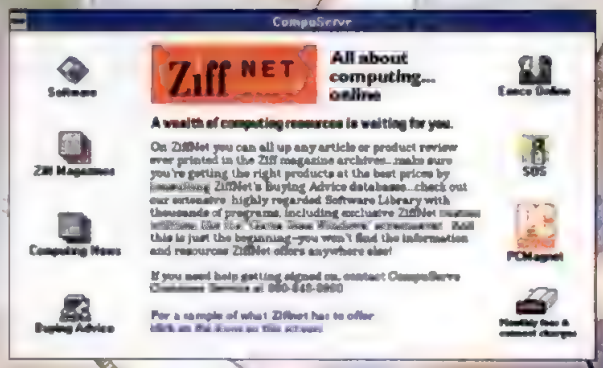


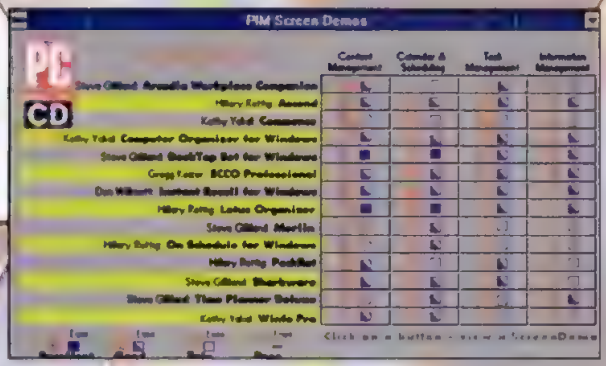
CALL TO ORDER NOW!

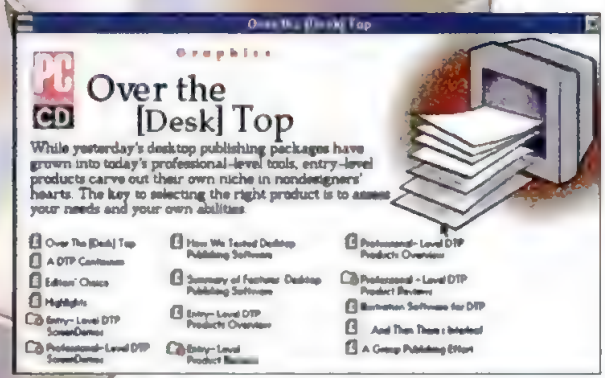
1-800-335-1195

Mention Priority Code: 4E5A

-ROM that puts a your PC:







Get an Entire Year of PC MAGAZINE CD — Today's Hottest Topics in a Unique Interactive Format

Start your subscription right away. You'll receive four quarterly releases for just $49.95.

Use your Visa, MasterCard or American Express account.

VISA

CALL NOW TO ORDER

1-800-335-1195

Mention Priority Code:

4E5A

Toll free number is available in the United States and Canada. Other countries, call

303-604-1464

Or fax your order to

303-604-7455

PC MAGAZINE CD

SYSTEM REQUIREMENTS: 386 or higher PC-compatible system, Windows™ 3.1, 6MB RAM, CD-ROM drive. Windows-compatible sound board recommended for some functions.

PC Magazine CD is $72 in Canada (includes Canadian GST and shipping charges); $99 for all other foreign orders (includes air mail charges). The U.S. single copy price of PC Magazine CD is $17.95.

PC MAGAZINE CD • P.O. Box 59494 • Boulder, CO 80322-9494

You Get The Greatest Value When

Multimedia has reached a new level.

Pentium power, Built-In CD-ROM and Local Bus Video all in one package.

- Internal 5.25" Double-Speed CD. Supports CD-ROM and CD Audio
- Choice of Intel 3.3v Pentium™ Processors, 75, 90 or 100MHz
- 10.4 LCD Available in Dual-Scan Color or Active Matrix Color Displays
- 16-bit Stereo Sound - Sound Blaster™ & SoundBlaster Pro™ Compatible
- Built-In TouchPad
- Supports PCMCIA 1 Type III or 2 Type II Cards
- Removable Hard Drive (250 to 800MB)
- 8MB RAM expandable to 40MB
- Built-In SIR Infared Interface
- Built-In 1.44MB Floppy Drive
- Ports: 1S, 1P, 1VGA, 1 Keyboard/Mouse, Modem & 2Audio in/out
- 1MB VRAM, Local Bus Video and Hard Drive
- Over 3 Hours of Battery Life
- Internal 1.44 3.5" Removable Floppy Drive
- Dual Battery Support
- 7.5 lbs including battery
- Includes Microsoft DOS & Windows, NiMH Battery, & Carrying Case
- Optional Port Replicator or Multimedia Docking Station
- **Optional Multimedia Bundle: $185.00** Includes: 6 Software Titles including 4 CDs, External Speakers & Microsoft Sound System Software

Power CD Dual Scan
Intel Pentium™ P-90 CPU 8MB RAM/340MB HD
$3195
Or Lease For $118/Month*

Power CD Active Matrix
Intel Pentium™ P-90 CPU 8MB RAM/340MB HD
$3895
Or Lease For $144/Month*

intel inside
pentium PROCESSOR

Power CD
PENTIUM CD

SoundPro CD

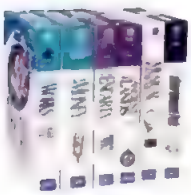
BUILT-IN CD ROM

This portable has a built-in CD ROM!

- Upgradable CPU options: Intel DX4™ 100 or 75MHz, DX2-66 or DX2-50 CPU's
- Built-In double speed CD ROM supports 5.25" CD's
- Base 4MB RAM upgradable to 32MB
- Removable Hard Drive up 800MB Capacity
- 9.5" LCD Available in Dual Scan or Active Matrix Displays
- Accelerated 32-bit VESA Local Bus Video w/ 1MB V-RAM
- Supports PCMCIA – 1 Type III or 2 Type II Cards
- 16-bit Stereo Sound - Sound Blaster™ & SoundBlaster Pro™ Compatible
- Built-In Microphone & Stereo Speakers
- Ports: 1S, 1P, VGA, Floppy & Audio in/out
- Weight: 6.6lbs. Including Battery
- Includes: MS DOS 6.22, Windows for Workgroups 3.11, NiMH Battery, AC Adapter & Carrying Case.
- **Optional Multimedia Bundle: $185.00** Includes: 6 Software Titles including 4 CDs, External Speakers & Microsoft Sound System Software

SoundPro CD Dual Scan
DX4™-75 Dual Scan Color, 4MB RAM/340MB HD
$2295
Or Lease For $90/Month*

SoundPro CD Active Matrix
DX4™-75 Active Matrix Color, 4MB RAM/340MB HD
$3195
Or Lease for $118/Month*



Optional Multimedia Bundle – $185.00

Bundle Includes Microsoft Sound System and Portable Speakers Plus Six Software Titles:

- MS Works CD-Multi – Media Version
- MS Encarta CD – Multi-Media Version
- MS Musical Instruments CD
- MS Ancient Lands CD
- MS Money – On 3.5" disk
- MS Entertainment Pack – On 3.5" disk

1 or 2 YEAR Warranty Extensions Available

UPGRADE
Upgrade your CPU, Hard Drive, Memory or Display at our expense. For 90 days after original purchase, you pay only the price difference of the more powerful components you need.*
Call your AMS Sales Representative for details.

30 Day Money Back

If for any reason you are not completely satisfied with your AMS Notebook Computer just return it within 30 days and we will promptly refund your money.**

LIFE TIME TECH SUPPORT

Lifetime Toll Free Technical Support
Your use of the computer doesn't stop after your warranty expires and neither should your support. We're there to assist you, toll-free, for as long as you own your AMS computer

24 HOUR BBS

24 Hour BBS
No matter where you are, no matter the time of day, AMS is just a phone call away with full support services via our 24 hour Bulletin Board System.

World Class Service

AT&T Capital Corporation

*AT&T Capital Based on 36-month lease with 10% purchase option. Sales tax and shipping are additional. Rates subject to change without notice. Leasing is provided by AT&T Capital for qualified commercial purchasers. Call for details.
All trademarks and trade names are the property of their respective companies. Intel and Intel Inside are registered trademarks and Pentium is a trademark of Intel Corporation. Not responsible for errors in advertising.
**Money Back Guarantee. S/H and open software are non-refundable. Prices and specifications are subject to change without notice

You Buy AMS DIRECT

intel inside

SoundPro P-54

PENTIUM PROCESSOR POWER

Our SoundPro just got more powerful!

Now available with Intel Pentium™ Processor Power in a 6.7 lb package...
Multimedia Design Adds Built-In Sound, 256K Cache and 1 MB Local Bus Video And I/O.

- Powerful Intel Pentium™ 75 or 90MHz CPU
- Upgradable 9.5" Display. Available in Dual Scan or Active Matrix Color
- 5.9 lbs. Monochrome - 6.7 lbs. Color
- 8MB RAM - Upgradable to 16 or 40MB's
- Local Bus Video & Local Bus HD I/O with built-in 256k cache
- Over 3 Hours of Battery Life

UPGRADE TO PENTIUM™ 90 FOR $225.00

- Ports: 1 16550 High Speed Serial Port, 1 Parallel, 1 Video, 1 Keyboard/Mouse, 1 Docking Station, Audio in/out
- Removable Hard Drive Up to 800MB Capacity
- Includes AC Adapter, NiMH Battery, Carrying Case, MS DOS 6.22 & Windows for Workgroups 3.11
- Options: Docking Station, Internal 14.4/14.4 Fax Modem, Car Adapter, External Battery Charger, Extra Batteries
- **Sound System Upgrade: $125.00**
  Includes: External Speakers & Microsoft Sound System Software

SoundPro P-54 Dual Scan
Intel Pentium™ P-75 CPU 8MB RAM/340MB HD
$2395
Or Lease For $94/Month*

SoundPro P-54 Active Matrix
Intel Pentium™ P-75 CPU 8MB RAM/340MB HD
$2995
Or Lease For $117/Month*

SoundPro

ACTIVE MATRIX BLOWOUT!

Our Award winning TravelPro 5300 series just got better!

Now with sound module and local bus I/O, the SoundPro is the clear winner.

- Upgradable CPU options: Intel DX4™-100 or 75MHz, DX2-50, or SX-33
- Available in upgradable 9.5" Active Matrix, Dual Scan Passive or Monochrome Displays
- 6.3 lbs. Color, 5.9 lbs. Monochrome
- 4MB RAM, 1.44MB Floppy
- Local Bus Video & Local Bus HD I/O
- Over 3 Hours of Battery Life
- Removable Hard Drive Up to 800MB Capacity
- Includes AC Adapter, NiMH Battery, Carrying Case, MS DOS 6.22 & Windows for Workgroups 3.11
- Options: Docking Station, Internal 14.4/14.4 Fax Modem
- **Sound System Upgrade: $125.00**
  Includes: External Speakers & Microsoft Sound System Software

SoundPro Dual Scan
DX4™-75 4MB RAM/340MB HD
$1950
Or Lease For $76/Month*

SoundPro Active Matrix
DX4™-75 4MB RAM/340MB HD
$2595
Or Lease For $102/Month*

TravelPro 350C

BEST BUY

When you're looking for the best value in a notebook computer, look no further than the TravelPro 350C.

- Choice of Upgradable Intel CPU's. 486 SX-33, DX 2-50 or DX4™ 75MHz
- 3.3v Low Voltage for Extended Power Management
- 9.5" Dual Scan Passive Color Display
- PCMCIA Type III - Takes either 1 Type III or 2 Type II Cards
- Large Center Based 25mm Trackball with Palmrest
- 4MB RAM - Upgradable to 8, 16 or 20MB's
- Unique Removable Keyboard for easy access to upgrades and International Keyboard support
- Includes AC Adapter, NiMH Battery, Carrying Case, MS DOS 6.22 and Windows for Workgroups 3.11

TravelPro 350C
DX2-50 Dual Scan Color, 4MB RAM/250MB HD
$1495
Or Lease For $59/Month*

Windows NSTL PC Digest RATING REPORT

TO ORDER CALL

800-868-8108

MONDAY THRU FRIDAY 6:00 am - 6:00 pm SATURDAY 9:00 am - 3:00 pm PST

Corporate, Dealer & Government Pricing Available

AMS DIRECT

12881 Ramona Blvd., Irwindale, CA 91706
Tel:818/814-8851 Fax: 818/814-0782

CIRCLE 235 ON READER SERVICE CARD

.....Play to win and save yourself some money.....

Make the ultimate move for serious gamers who know the score when it comes to buying computer gaming magazines. Subscribe to Computer Gaming World now and save up to 47%!

Every monthly issue brings you exclusive first looks at the hottest, newest games... the latest in multimedia, CD-ROM and interactive environments. Plus winning strategies, master clues, in-depth reviews – all the help you need to pump up your system and play out your fantasies on this planet and beyond.

Score points and cosmic savings now with Computer Gaming World. We're worlds apart from any other computer game magazine.

- One year/12 issues – $27.94. **YOU SAVE 41%!**
- Two years/24 issues – $49.97. **YOU SAVE 47%!**

Savings based on annual cover price of $47.40.

CALL NOW TO SAVE UP TO 47%

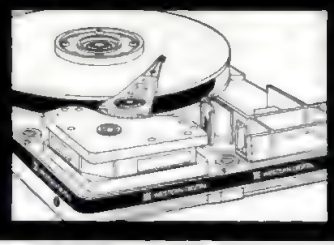
1-800-827-4450

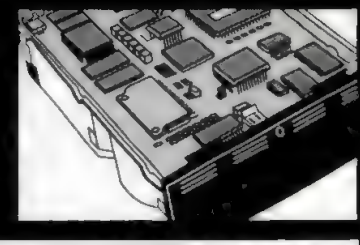
To ensure savings, mention this code to the operator who answers your call: 4Z95.

MEGA HAUS
HARD DRIVES

The Drive Authority!

Come visit us on the Internet
megahaus@phoenix.net





UNEQUALED REPUTATION

Nobody knows drives like MegaHaus. We have specialized in storage solutions for over 8 years. Repeat business from satisfied customers is the backbone of our business. We satisfy our customers.

DIRECT REPLACEMENT WARRANTY

During the first year of your warranty, we replace: not repair, any defective items. All items receive lifetime technical support from our factory trained techs.

SAME DAY SHIPPING

Our multi-million dollar inventory offers you the best diversity and availability in the market. We ship most orders the same day. Each order is checked at least four times for accuracy.

FAST, EASY INSTALLATION

Anyone can sell you a hard drive. We sell easy to install storage solutions. We spend countless hours researching the best solutions, then create our quick precise installation guides for each kit.

UNBEATABLE DEALS

Maxtor

FREE Max Blast auto install software (with 540MB and larger)
2 Yr "No Quible Service Policy" offers advanced replacement.

420MB	$179	1050MB	$349
540MB	$199	1260MB	$369
850MB	$252		

MICROPOLIS

Best buy large capacity SCSI drives!
5yr advanced replacement warranty.

2050MB	8.5ms	7200rpm	MC4221	$879
4294MB	8ms	7200rpm	MC3243	$1479
9100MB	12ms	5400rpm	MC1991	$2529

OPTICAL DRIVE SALE!

Price includes 1 FREE disk! Complete internal and external kits available for all computers.

Capacity	Brand	Speed	Buffer	Wty	Price
230MB	Fujitsu	30ms	256K	1yr	$569
1.3Gig	NEC	25ms	1MB	2yr	$1799
1.3Gig	Maxoptix	23ms	4MB	1yr	$2149

JAPANESE QUALITY! **FUJITSU** INCREDIBLE PRICE!

530MB	3.5"	13.8ms	IDE	2yr wty.	$195
530MB	3.5"	13.8ms	SCSI	2yr wty.	$212
1080MB	3.5"	9.5ms	SCSI	5yr wty.	$499

SyQuest 540MB of removable storage only $399!
Buy a 270MB IDE drive with 1 cartridge for $389 and get a 2nd cartridge for only $10*. Each 270MB disk also comes with free Fast Back Express software. The 270MB IDE drive is 3 1/2" x 1" high, 13.5ms, 128K buffer
(* $10 cartridge is a limited promotion. Begins April 12, 1995. Limited to the first 200 orders.)

PIONEER

External CD ROM changers. No more disc swapping!

6 Disc	Double Speed	DRM602X	$399
6 Disc	Quad Speed	DRM604X	$819
18 Disc	Quad Speed	DRM1804X	$1899

HARD DRIVES

CONNER

IDE			
540MB	15ms	CFS540A	$219
850MB	10ms	CNR850A	$275
1275MB	9ms	CNR1275A	$389
SCSI			
1080MB	11ms	CFP1080S	$509
2147MB	8.5ms	CFP2105S	$879
2147MB	8.5ms	CFP2107S	$1059

MICROPOLIS

SCSI			
2050MB	8.5ms	MC4221	$879
4294MB	8ms	MC3243	$1479
9100MB	12ms	MC1991	$2529
WIDE SCSI			
2050MB	8.5ms	MC4221W	$999
4294MB	8ms	MC3243W	$1669
9100MB	12ms	MC1991W	$2799
SCSI-AV Audio / Visual tuned drives			
2000MB	8.5ms	MC4221AV	$1059
4294MB	8ms	MC3243AV	$1629
9100MB	12ms	MC1991AV	$2729

Seagate

IDE			
420MB	14ms	ST3491A	$179
545MB	14ms	ST3660A	$200
722MB	12ms	ST3780A	$245
850MB	12ms	ST5850A	$285
1083MB	12ms	ST31220A	$389
SCSI (WIDE SCSI also available)			
1052MB	9ms	ST31230N	$519
2147MB	9ms	ST32430N	$949
2147MB	8ms	ST32550N	$1049
4290MB	9ms	ST15230N	$1459
4290MB	8ms	ST15150N	$1599
9080MB	11ms	ST410800N	$3049

WESTERN DIGITAL

IDE			
420MB	12ms	AC2420	$185
540MB	12ms	AC2540	$209
853MB	10ms	AC2850	$285
1083MB	10ms	AC31000	$399
1280MB	10ms	AC31200	$439

WE SELL HIGH QUALITY DISK ARRAYS AT AFFORDABLE PRICES!

HARD DRIVES

Quantum

IDE			
365MB	11ms	LT365A	$179
420MB	13ms	TB420A	$183
540MB	14ms	MV540A	$209
541MB	11ms	LT540A	$219
731MB	11ms	LT730A	$252
SCSI			
365MB	11ms	LT365S	$189
540MB	14ms	MV540S	$228
540MB	11ms	LT540S	$242
731MB	11ms	LT730S	$262
1080MB	9ms	IMP1080S	$539
2150MB	8ms	XP32150	$999
2160MB	9.5ms	IMP2160S	$889

SYQUEST

The #1 name in removable media drives!

SCSI	88MB	200MB	270MB
Bare Drive	$249	$350	$349
Drive with 1 disk	$298	$422	$408
External	$309	$410	$409
Internal Kit	$369	$499	$469
Performance Kit	$469	$599	$569
External Kit for Mac	$369	$489	$469

IDE		Drive	PC Kit	Portable
270MB	SQ3270A	$330	$429	$529

Genuine Syquest Cartridges
Qty 2-4 / 5-9 / 10+ or with drive 44MB $53/51/50
88MB $55/51/49 105MB $56/54/53
200MB $80/75/72 270MB $65/62/59

NOTEBOOK UPGRADES

2.5" Drives			SCSI	IDE
240MB	14ms	Fujitsu	$279	$279
256MB	17ms	Quantum	$269	$274
514MB	17ms	Quantum	$429	$439

Adaptec PCMCIA to SCSI / Parallel to SCSI $219 / $135
PCMCIA internal docking bay for desktop $119

MISCELLANEOUS

Drive Media! WIDE SCSI, Optical, Macintosh & Power PC Drives, Hard Disk Cards, PCMCIA, 2 1/2" Drives, Floppy Drives, IBM PS/1, PS/2, and Tandy Drives.

CD ROM DRIVES

SCSI				
Toshiba	XM3501	4X	155ms	$299
NEC	CDR4X	4X	220ms	$325
Plextor	PX43CS	4X	170ms	$339
Sony	CDU55S	2X	250ms	$159
Sanyo	SH93R	2X	280ms	$149
IDE (ATAPI)				
Mitsumi	CRMCFX400	4X	230ms	$199
Sony	CDU55A	2X	250ms	$135

MULTIMEDIA KITS

SCSI Drive, sound card (in retail pkg)
PM=Media Vision Premium 3D, PRO=Media Vision Pro 3D
SB= Sound Blaster 16 SCSI. SA= Sound Blaster SCSI ASP

	PREM	PRO	SB	SA
SH93R	$279	$409	$309	$339
CDR4X	$439	$579	$469	$509
XM3501	$469	$609	$499	$529

CD ROM TOWERS

Multiple drives in a single enclosure.

	2 Drive	4 Drive	7 Drive
Sony 2X	$419	$879	$1499
NEC 4X	$689	$1439	$2439
Toshiba 3501	$755	$1579	$2679

TAPE DRIVES

-Floppy based includes 1 tape & backup software
SAVE $10 w/ hard drive purchase

		Internal	External
420MB	Connor	$187	$339
850MB	Connor	$282	$429

-SCSI Kit includes 16bit card, DOS or Windows software & 1 tape.

			Bare	Kit
250MB	Conner	2150	$339	$489
525MB	Conner	2525	$479	$629
2Gig	HP	35470	$749	$849
2Gig	Conner	4320	$779	$879
2-4Gig	Conner	TSM4000	$539	$609
4-8Gig	Conner	4324	$849	$949
4-8Gig	HP	35480	$869	$969
4-10Gig	Conner	4326	$939	$1039
4-10Gig	HP	C1533A	$1049	$1159

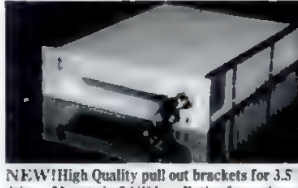
Backup Software
Novell NLM 50 user / unlimited / OS/2 $199 / $339
NovaStor OS/2 / Macintosh $89 / $99
TAPEDISK use our SCSI tapes as a regular drive $229

CONTROLLER CARDS

IDE		Alone	w/Drive
GSI 16Bit IDE accelerators (enhanced IDE)			
Boost Performance 30 to 80%! VESA coming soon.			
1533-18 2 IDE		$55	$39
1533-21 2IDE, 4 Floppy		$59	$49
1533-32 2IDE, 4 Floppy, IO		$125	$115
TEKRAM			
DC280E, 4 drive Enhanced VESA, 2 16550 serial ports, 1 EPP parallel port, 1 game port		$65	$55
DC200S 16Bit IDE w/ High Speed IO		$55	$45
DC290N Bus Master PCI		$59	$49
DC600CF 16Bit Caching		$89	$79
DC680C 32Bit Local Bus Cache		$109	$99
DC690C 32Bit PCI Cache		$149	$139
SCSI			
ADAPTEC			
A1522BASIC 16Bit		$129	$109
A1542COREL 16Bit		$235	$225
A2742 EISA		$379	$369
A2842 VESA		$259	$249
A2940Kit PCI		$299	$289
Tekram (includes COREL SCSI)			
DC300B 16Bit		$159	$149
DC800B 16Bit Caching		$199	$189
DC380B 32Bit VESA		$179	$169
DC880B 32Bit VESA Cache		$299	$289
Future Domain 1680 16Bit		$134	$119
QLOGIC PCI SCSI & WIDE		$325	$315

Many other brands & types, including WIDE SCSI.

DRIVE HARDWARE



NEW! High Quality pull out brackets for 3.5" hard drives. Mounts in 5 1/4" bay. Entire frame is metal, gold connectors rated at 50K insertions, built in cooling fan. SCSI unit has ID select on cartridge. Great for security, RAID, or Backup. Hot swapable!

SCSI 1 $85 2-9 $82 10+ or w/ drive $79
IDE 1 $79 2-9 $76 10+ or w/ drive $73

MEGA HAUS
HARD DRIVES

2201 Pine Drive
Dickinson, Texas 77539

1-800-786-1182

Ad. Code # PA51 Sales Hours (Central Standard Time)
8am - 8pm Monday thru Friday 9am - 3pm Saturday
FAX (713) 333-3024 Local (713) 333-1910
T.T.Y.(Deaf) 800-473-0972 Corporate/Government 800-786-1146
We sell within the United States, its territories, and Canada (sorry no international orders)

VISA MasterCard DISCOVER AMERICAN EXPRESS

NO SURCHARGE
We accept Fortune 500 & Government bids & PO's.
We check for COD and Credit Card fraud!

Prices & specifications subject to change without notice. Shipping charges are non-refundable. Returns must be in new condition and in original packaging. Defective items may not be returnable. No refunds on software or special orders (items not listed in ad.) All refunds subject to 15% restocking fee. Some exceptions may apply to warehouse deals. All trademarks are registered trademarks of their respective companies. Personal checks held for clearance. We reserve the right to refuse any sale for any reason. ©1995 MegaHaus Inc.

CIRCLE 018 ON READER SERVICE CARD

Insight AMERICA'S DISCOUNT SOURCE FOR

SYSTEMS

Packard Bell

- Intel 75MHz Pentium™ Processor
- 1 275GB HDD 8MB RAM Desktop Case
- Quad Speed, Multi-session, XA-compatible CD-ROM
- 16-bit Stereo Sound Card
- Packard Bell SRS® 3D Amplitheater Stereo Sound and Speakers
- PCI Local Bus 1MB Video RAM
- 3.5", 1.44MB Floppy Drive
- Flash BIOS
- 14.4 Fax/Modem Installed
- Telephone Answering System with Full Duplex Speakerphone
- Keyboard and Mouse
- 16 Software Titles including: New Grolier Encyclopedia, Microsoft Works, Microsoft Productivity Pack, Action and Clipmedia ...and 12 More!

PBF448CD **$1,949**

MODEMS

MBUSRSP34I **$229**

U.S.Robotics

Sportster 14.4/14.4 Int. Faxmodem	$99
Sportster/Courier 28.8/14.4 Ext. Faxmodem	259/449
Sportster/Courier 28.8/14.4 Int. Faxmodem	229/409

MOTOROLA

Fastalk II 14.4/14.4 Ext. Faxmodem	$119
Fastalk II 14.4/14.4 Int. Faxmodem	99
Cellect 14.4 Cellular Pocket Modem	269
Cellect 14.4 PCMCIA Faxmodem	289
Lifestyle PCMCIA Faxmodem	179
Power PCMCIA Cellular Faxmodem	229

14.4/14.4 Int. MBSUP14I	$109
14.4/14.4 Ext. MBSUP14LCE	129
14.4/14.4 PCMCIA MBSUPS014	259
28.8 V.34 Ext. MBSUPV34E	309
28.8 V.34 Int. MBSUPV34I	189

Boca

Sound Expression VSP Int. 14.4 S/R Faxmodem $189

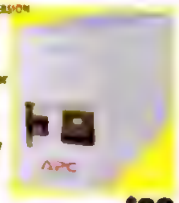
Megahertz

14.4/14.4 PCMCIA XJACK MBXJ1441EG	$209
14.4/14.4 Ethernet Combo MBXJ144ETH	419
28.8/14.4 PCMCIA XJACK V.34 MBXJ2288	429

UNINTERRUPTIBLE POWER SUPPLIES

APC

AMERICAN POWER CONVERSION



Back-UPS 280
- Battery backup power
- 2 year warranty $25,000 Lifetime Equipment Protection
- Unmatched reliability
- Hot swappable, user replaceable batteries

UPAPCBK280 **$99**

APC

Backup-UPS Pro 280	$139
Backup-UPS Pro/V/S 420	209/239
Backup-UPS Pro/V/S 650	279/299
Smart UPS 250	215
Backup-UPS /Smart UPS 400	139/269
Backup-UPS/Smart UPS 600	239/329
Backup-UPS/Smart UPS 900	339/469
Backup-UPS/Smart UPS 1250	439/579

SOFTWARE

Best-Selling CD Titles

National Parks MPC SWRWCEQ01	$29
Pro Phone Select 213836	139
MS Encarta 1995 213498	65
Corel Gallery MPC SWRWCCR01	35
Delorme Street Atlas SWRDCCM61	69
MYST MPC SWRWCB820	49
MS Bookshelf 1994 213875	59
Seventh Guest SWRCV177	45
Where in World is Carmen Sandiego? SWRDCBB01	45
Delorme Map n' Go SWRWCDLM03	35
MS Cinemania 1995 213443	49
Outpost Windows SWRWCSR46	49
Descent 2 0 CD 215863	45
MS Dinosaurs SWRWCMS44	49
MS Ancient Lands MPC 213451	49
Just Grandma and Me SWRWCB847	35
Print Shop Deluxe Ensamble SWWRDCB862	59
MS Publisher 2 0 SWRDCM526	85
Small Blue Planet MPC SWRWCEQ07	29

Best-Selling Software Titles

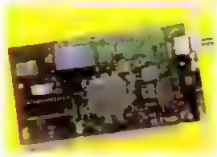
Upgrade 213462 **$259** Upgrade 213463 **$339**

Essential programs specifically designed to work together, so you can focus on your ideas, not your software. You get word processing, spreadsheet, presentation graphics software, and a workstation license for electronic mail. The Microsoft Office Professional includes database software.

Aldus Pagemaker 5.0 SWRW3AF58	$529
AutoCAD CT Windows 534488	429
dBASE V for Windows 214134	329
Laplink Pro Windows SWRW3TR11	129
Microhelp Uneraser Windows SWRW3M31	39
Norton Utilities 8.0 SWRD3NU80	109
Norton PC Anywhere Windows 214768	125
Peachtree Complete 8.0 DOS SWRD3P11	175
Procomm Plus for Windows 2.0 SWRDDDS16	125
QEMM 7 5 316661	59
Quicken for Windows 4.0 SWRW3QU40	45
Winfax Pro 4.0 SWRW3DE07	79
MS Works 3.0 987433	85
ACT! for Windows SWRWDCND4	169
Harvard Graphics 3.0 Windows 214448	279
MS Publisher 2 0 for Windows SWRWDMS06	89
Harvard Graphics 3 0 DOS SWRD3SU04	379
Peachtree Accounting 3 0 for Win. SWRW3PE30	105
Quicken 8.0 DOS SWRDDIU01	39
Omnipage Pro 5 0 for Windows SWRWDEE01	449
Norton Speed Drive 4.0 SWRW3NU53	59
Corel SCSI SWRW3CR06	79
MS Office 4.2 Standard on CD SWRWDMS02	449
MS FoxPro 2.6 for Windows 213464	89

NETWORKING

SMC



Ethernet+ 16T Ultra TP NWEMCE16T **$89**

SMC

SMC Ethercard Elite 16T Ultra Coaxial	$69
SMC Ethercard Elite 16C Ultra Combo	102
SMC Ethercard Elite 16T Ultra 8-pack	449
SMC 10Base-T Tiger Hub TP6	165
Token Card Elite ALSO AVAILABLE!	

Xircom

Xircom PE3-10BT Pocket Ethernet	$259
Xircom PPX-03 Parallel Port Multiplexor	75
Xircom PT02-16BT Token Ring 16/4 RJ-11	549

3Com

3Com Etherlink III	$105
3Com Etherlink III BNC 5-pack	495
3Com Etherlink III BNC 20-pack	1,799
3Com Etherlink III TP	105
3Com Etherlink III TP 5-pack	475
3Com Etherlink III TP 20-pack	1,699
3Com Etherlink III Combo TP/BNC	125
3Com Etherlink III Combo TP/BNC 5-pack	499
3Com Etherlink III EISA BNC	219
3Com Etherlink III EISA BNC 5-pack	979
3Com Etherlink III EISA TP	219
Tokenlink III ALSO AVAILABLE!	

ARTISOFT

Lantastic 6.0 Single User 3.5" NWA5900169	$79
Lantastic 6 0 Starter Kit BNC NWA5900269	235
Lantastic 6.0 Add On Kit NWA5900369	125
Lantastic 6 0 5-User 3.5" NWA5900569	329

MONITORS

CTX

14", .28, 1024 x 768, N.I CM1451ES	$239
15", .28, 1024 x 768, N.I CM1585GM	329
17", .28, 1280x1024, N.I CM1785GM	649

SONY

15" MultiScan 15SF, .25, 1280x1024 CMSE15SF1	$479
17" 17SE1, .25, 1600x1200 CM17SE1	969
17" MultiScan17SF1, .25, 1600x1200 CM17SE1	919
20" MultiScan 20SF, .30, 1600x1200 [illegible]	1,899

CMDX17 **$619**

MAG

15", .28, 1280x1024, N.I CMDX15F-1	$319
17", .26, 1280x1024, N.I CMDX17	619
21", .28, 1600x1200, N.I CMDX21F	1,699

MAGNAVOX

Smart.Very smart.

15", .28, 1024x768, N.I CMMA2015	$289
15", .28, 1280x1024, N.I CMMAA015	339
17", .31, 1024x768, N.I CMMA4017	629
20", .31, 1280x1024, N.I CMMA20CM84	999

NEC

NEC XE 15", 1280x1024, .28, N.I. CMNECXE15	$569
NEC XE 17", 1280x1024, .28, N.I. CMNECXE17	999
NEC XE 21", 1280x1024, .28, N.I. CMNECXE21	2,029
NEC XP 15", 1280x1024, .28, N.I. CMNECXP15	669
NEC XP 17", 1280x1024, .28, N.I. CMNECXP17	1,299
NEC XP 21", 1600x1200, .28, N.I. CMNECXP21	2,449

CMMA2015 **$289**

VIDEO CARDS

ATI

Graphics Expression, 2MB, ISA/VLB/PCI	$209
Graphics Pro Turbo, 2MB, ISA/VLB/PCI	379
Graphics Pro Turbo, 4MB, ISA/VLB/PCI	569

DIAMOND

Stealth 64-bit, VC, PCI/VLB, 2MB VRAM	$289
Stealth 64-bit, VC, PCI/VLB, 4MB VRAM	499
SpeedStar Pro, VC, ISA/VLB 1MB DRAM	119
Stealth 32-bit, VC, PCI/VLB 1MB DRAM	175
Stealth 32-bit, VC, PCI/VLB 2MB DRAM	225
Stealth Pro, VC, VLB, 1MB VRAM	229
Stealth 24-bit, VC, VLB/ISA 1MB DRAM	145
Stealth Pro, VC, VLB/ISA, 2MB VRAM	315
Viper, VC, VLB/PCI, 2MB VRAM	325

SCANNERS

HEWLETT PACKARD

HP Scanjet IIIP 300 dpi grayscale HPSCJTIIIP	$449
HP Scanjet IIIC 1600 dpi color HPSCANSC	849

UMAX

UC630 600 dpi Color Scanner UM630LEK	$599
UC1260 Color Scan 1200x600 dpi UM1260PCK	1,099
PS2400X2400 dpi Color Scanner UM2400XL	2,849
Vista-S6 600 dpi Color Scanner UMVS6K	749

MICROTEK

ScanMaker IISP Color 300x600dpi SCMTIISP	$549
ScanMaker IIHR Color 2400 dpi SCMTHRII	849

Canon

IX-3010 Mono Flatbed 900x1200dpi CNIX3010	$299
IX-4015 Color Scanner 400x1200dpi CNIX4015W	699

FUJITSU

ScanPartner™Jr 300dpi, 256 grayscale FJSCSPJI $449

NOVELL

4.1 Novell Upgrades

Any 5 user to 4.1 5 user CD 214604	$299
Any 10 user to 4.1 10 user CD 214604	589
Any 25 user to 4.1 25 user CD 214607	899
Any 50 user to 4.1 50 user CD 214610	1,179
Any 100 user to 4.1 100 user CD 214613	1,849

4.1 Full Packages

Netware 4.1 5 user CD 214602	$609
Netware 4.1 10 user CD 214609	1,369
Netware 4.1 25 user CD 214601	2,049
Netware 4.1 50 user CD 214603	2,779
Netware 4.1 100 user CD 214605	3,869

We carry all Novell upgrades. If you don't see what you need, call!

Insight

- If you don't see what you need or if you find a lower price, call us!
- Most in-stock items delivered the next business day. *Ask about same day delivery!*
- We love businesses! Quick P.O. confirmation & credit approvals. *Ask about volume pricing.*

PC MAGAZINE PC MAGAZINE

800-998-8030

AIR INSIGHT SAME DAY DELIVERY

Order 24 hours a day!

COMPUTERS, HARDWARE & SOFTWARE.

PRINTERS

HEWLETT® PACKARD

1 Color option only $39

Hewlett Packard DeskJet 540 Printer

Incredible high quality 600x300 dpi printer at an amazingly low price

HPDJ540 **$289**

HEWLETT® PACKARD

HP LaserJet 5P 600 DPI Laser 6ppm 2MB	$849
HP DeskJet 320 Portable Ink Jet 600 dpi 3ppm	299
HP DeskJet 540 Ink Jet 600 dpi 3ppm	289
HP DeskJet 560C Ink Jet color 600 dpi 3ppm	479
HP DeskJet 1200CS 600 dpi 7ppm 2MB	979
HP DeskJet 1200PS 600 dpi 7ppm 4MB	1,579

OKIDATA

ML380 Dot Matrix 24-pin 192 CPS	$215
ML 590 Dot Matrix 24-pin 360 CPS	425
OL400E LED 4ppm 512K	409
OL410E LED 4ppm 2MB	539
OL410 E/PS LED 4ppm 2MB	759
OL810 LED 8ppm 2MB	909
OL850 LED 8ppm 2MB	1,239

TEXAS INSTRUMENTS

MicroWriter LED 5ppm 512K	$469
MicroWriter PS23 LED 5ppm 2MB	619
MicroWriter PS65 LED 5ppm 2MB	819
MicroLaser 600 5ppm 2MB PS23	849
MicroLaser Pro E 12ppm 3MB	1,349
MicroLaser Pro 600 PS23	1,179
MicroLaser Power Pro 12ppm 6MB	1,589

Canon

BJ-10SX Portable Bubble Jet 360 dpi 110 CPS	$249
BJ-200EX Bubble Jet 720 dpi 248 CPS	235
BJC-4000 Color Bubble Jet 720 dpi 446 CPS	355
BJC-600 E Color Bubble Jet 720 dpi 240 CPS	469
LBP 430-Laser 4ppm 1MB	579
LBP 1260-Laser 12ppm 2MB	1,289

NOTEBOOKS

In Touch with Tomorrow

TOSHIBA

T2150 486 DX4/75
- 10.4" Dual Scan Color
- 250MB Hard Drive
- 4MB RAM
- 3 Year Mfg's Warranty

Built-in CD-ROM!

MAT2150CDS **$3,629**

TOSHIBA

T2100 486DX2/50MHz – Built-in Power Supply –

260MB 4MB 10.4" Monochrome	$1,449
330MB 4MB 10.4" Dual Scan Color	2,259
330MB 8MB 8.4" Active Matrix Color	3,119
T2450 486DX4/75MHz	
320MB 8MB RAM 9.5" Active Matrix Color	$4,009
500MB 8MB RAM 9.5" Active Matrix Color	4,309
T4850 486DX4/75MHz Multimedia	
500MB 8MB 10.4" Active Matrix Color	$4,563
772MB 8MB 10.4" Active Matrix Color	4,862
T4800 486DX 4/75MHz	
500MB 8MB 9.5" Active Matrix Color	$4,222
T4900 Pentium 75MHz	
772MB 8MB 10.4" Active Matrix Color	$6,499

IBM

ThinkPad 360 486DX2/50	
340MB 4MB Active Color	$2,935
540MB 4MB Dual Scan Color	2,689
540MB 4MB Active Color	3,299
ThinkPad 755 486DX4/100	
540MB 8MB Dual Scan Color	$4,949
810MB 8MB Dual Scan Color	5,399
540MB 8MB Active Color	5,949

TEXAS INSTRUMENTS

M-Series Multimedia	
340MB 4MB DX2/50 9.5" Dual Scan Color	$2,096
455MB 4MB DX2/50 8.4" Active Color	2,595
340MB 4MB DX4/75 8.4" Active Color	2,999
455MB 4MB DX4/75 9.5" Dual Scan Color	2,779
455MB 4MB DX4/75 8.4" Active Color	3,265
524MB 4MB DX4/100 9.5" Active Color	4,189

IDE HARD DRIVES

WESTERN DIGITAL

1280MB
- 10ms
- 3.5" 1"H
- 128k cache
- 4,500 RPM
- Enhanced IDE

WD31200A **$399**

SCSI HARD DRIVES

Seagate

4294MB
- 8ms
- 3.5" HH
- 1,024k cache
- 7,200 RPM
- Fast SCSI-2

ST15150N **$1,599**

HARD DRIVES International

The Mass Storage Experts.

Capacity*	Interface	Model	Access	FF/Height	Bare
WESTERN DIGITAL					
540MB	IDE	WD2540A	11ms	3.5" 1"H	$209
730MB	IDE	WD2730A	10ms	3.5" 1"H	255
850MB	IDE	WD2850A	10ms	6.5" 1"H	275
1080MB	IDE	WD3100A	10ms	3.5" 1"H	385
1280MB	IDE	WD3120A	10ms	3.5" 1"H	399
CONNER					
425MB	IDE	CFS425A	14ms	3.5" 1"H	$185
541MB	IDE	CFA540A	14ms	3.5" 1"H	205
850MB	IDE	CFA850A	10ms	3.5" 1"H	289
1275MB	IDE	CFA1275A	10ms	3.5" 1"H	399
Maxtor					
425MB	IDE	MX7425AV	12ms	3.5" 1"H	$195
540MB	IDE	MX7540AV	12ms	3.5" 1"H	209
850MB	IDE	MX7850AV	12ms	3.5" 1"H	279
1260MB	IDE	MX71260AV	12ms	3.5" 1"H	419
Quantum					
420MB	IDE	QULT420A	12ms	3.5" 1"H	$189
540MB	IDE	QULT540A	11ms	3.5" 1"H	235
730MB	IDE	QULP730A	11ms	3.5" 1"H	259
Seagate					
341MB	IDE	ST9385AG	16ms	2.5" 19mm	$279
524MB	IDE	ST9655AG	16ms	2.5" 19mm	419
420MB	IDE	ST3491A	13ms	3.5" 1"H	175
545MB	IDE	ST3692A	14ms	3.5" 1"H	179
722MB	IDE	ST3780A	12ms	3.5" 1"H	249
850MB	IDE	ST5850A	12ms	3.5" .75"H	265
1083MB	IDE	ST31220A	12ms	3.5" 1"H	375

Capacity*	Interface	Model	Access	FF/Height	Bare
MICROPOLIS					
2100MB	SCSI	MC4221S	8.5ms	3.5" 1"H	$999
2100MB	SCSI	MC4221AV	8.5ms	3.5" 1"H	1,059
4300MB	SCSI	MC3243S	8.5ms	3.5" HH	1,499
4300MB	SCSI	MC3243AV	8.5ms	3.5" HH	1,599
9100MB	SCSI	MC1991	12ms	5.25" FH	2,899
9100MB	SCSI	MC1991AV	12ms	5.25" FH	2,999
CONNER					
1060MB	SCSI	CFP1060S	10ms	3.5" 1"H	$509
2147MB	SCSI	CFP2105S	8.5ms	3.5" 1"H	925
2147MB	SCSI	CFP2107S	8.5ms	3.5" 1"H	999
4294MB	SCSI	CFP4207S	9ms	3.5" HH	1,619
Quantum					
365MB	SCSI	QULT365S	11ms	3.5" 1"H	$195
540MB	SCSI	QULT540S	11ms	3.5" 1"H	255
730MB	SCSI	QULT730S	11ms	3.5" 1"H	289
1080MB	SCSI	QUEM1080S	9.5ms	3.5" 1"H	539
1440MB	SCSI	QUEM1400S	9.5ms	3.5" 1"H	739
2150MB	SCSI	QUEM3125S	8ms	3.5" 1"H	969
4280MB	SCSI	QUGP4280S	8.5ms	3.5" HH	1,599
Seagate					
545MB	SCSI	ST5660N	12ms	3.5" .75"H	$299
1050MB	SCSI**	ST31250N	8ms	3.5" 1"H	699
1052MB	SCSI	ST31230N	9ms	3.5" 1"H	499
2100MB	SCSI	ST32430N	9ms	3.5" 1"H	899
2145MB	SCSI**	ST32550N	8ms	3.5" 1"H	959
4294MB	SCSI**	ST15150N	8ms	3.5" HH	1,599
4294MB	SCSI	ST15230N	9ms	3.5" HH	1,399
9080MB	SCSI	ST410800N	11ms	5.25" FH	2,999

*Capacities based upon manufacturer's quoted capacity where 1MB=1,048,576 bytes **Barracuda Drive

EPSON

Action Laser 1400
- 4ppm
- True 600x600dpi
- 1 MB RAM
- 100 sheet capacity
- Limited 2 Year Manufacturer's Warranty
- EPA Energy Star Compliant

EPSC148001 **$669**

TEXAS INSTRUMENTS

TravelMate 5000
- 75MHz Pentium Processor
- 10.4" Active Matrix
- 8MB RAM exp to 40MB
- 810MB Hard Drive
- PCI Local Bus
- 2-Type II or 1-Type III PC Card slots
- 2 Lithium Ion Batteries
- 3 Year Mfg's Warranty

TEXTMPCT7 **$5,529**

AST COMPUTER

Ascentia 810N
- 486DX2/66MHz
- 10.4" Dual Scan Color Display
- 4MB RAM
- 250MB HDD
- 3 Year Manufacturer's Warranty

5018883-3001 **$2,355**

EVEREX

9.5" Dual Scan Color

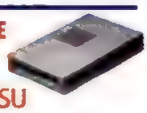
486 DX2/50MHz
- 4MB RAM
- 250MB HDD
- PCMCIA
- 16-bit Sound
- MS DOS and Windows
- 2 Year Mfg's Warranty

EVX50CS4/2 **$1,980**

EPSON

LQ-300 Dot Matrix 24-pin 240 CPS	$195
LQ-570+ Dot Matrix 24-pin 225 CPS	249
Stylus 800+ Inkjet 360 dpi 250 CPS	219
Stylus 1000 Inkjet wide carriage 360 dpi	449
Stylus Color Inkjet 720 dpi 200 CPS	509
Action Laser 1100 4ppm 1MB	369
Action Laser 1600 6ppm 2MB	775

REMOVABLE STORAGE



FUJITSU

Fujitsu Int. MO 230MB (PC) w/2 Cart	$699
Fujitsu DynaMO 230 (Mac) w/1Cart.	899
Fujitsu DynaMO 230 (PC) w/1 Cart	749

CD-ROM DRIVES

TEAC

CD55 Superquad 4x CD-ROM w/controller $259

PLEXTOR

4-Plex Internal w/256K Cache	$339
6-Plex Internal w/256K Cache	599

TOSHIBA

Model 3501
Internal Quad Drive, Bare..... $349 16 bit kit.... $439

Talon

Internal Quad Drive w/16 bit Sound Card $249
Bare Drive..... 199

MEMORY

PNY The Memory Leader. Worldwide

Call for all other memory products and prices!

Only $31/MB

16MB Memory Module
- w/installation video
- 4 x 32

$499

PC CARD (PCMCIA)

BOCA

Sound Expression VSP Int. 14.4/14.4 Faxmodem. $169

Megahertz

14.4/14.4 Cellular Faxmodem	$299
14 4/14 4 send/rec Faxmodem XJack	209
28.8/14.4 PCMCIA Faxmodem XJack SFR V.34	389

MOTOROLA

14.4/14.4 PCMCIA Faxmodem $179

U.S. Robotics

Courier 28.8/14 4 PCMCIA Faxmodem V.34	$389
Sportster 28.8/14.4 PCMCIA Fax/Data V.34	369

Xircom

Network combo	$259
Network RJ-45	219
Network BNC	219

TAPE BACKUPS

COLORADO MEMORY SYSTEMS

250MB Internal Tape Backup	$159
350MB Tape Backup Internal	169
Trakker 250MB External Parallel	269
Trakker 700 External Parallel	459

CONNER

TapeStor 420MB Internal Tape Backup	$179
TapeStor 850MB Tape Backup	269

EXABYTE

8mm 5.0Gig Model 8505 Internal	$2,199
8mm 2.5Gig Model 8205 Internal	1,299
8mm Tape Cartridge	10

IOMEGA

Iomega Tape250 Internal	$119
Iomega Ditto 420MB Internal	179
Iomega Ditto 850MB Internal	249

FREE Insight Catalog.

Thousands of products at great prices.

Prices and availability are subject to change without notice. All trademarks/trademarks are the properties of their respective owners. The little inside and PC logos are registered trademarks. Pentium® and DX4 are trademarks of Intel Corporation. Photos may not represent actual product. Typographic errors are subject to correction. The following products are subject to a 15% restocking fee when returned to Insight: Direct for a refund: non-insight computers, notebooks, and printers. Printers with toner installed cannot be returned. Software will not be accepted for a refund when the shrink-wrap is broken. All warranties will be honored by the manufacturer on above products after 30 days. Worry-Free™ 30 Day Money Back Guarantee: 15 days for printers without toner or ink installed and undamaged. Year Limited Warranty. Insight Computers may have some restrictions. Shipping & handling extra. Some 56k modems may have restrictions. Lease figures based on a 24 month F.M.V. lease. Sales tax and freight not included. Leases are not available and may require a deposit. Leases are available to businesses only. 1912 W. 4th St., Tempe, AZ 85281 602/902-1000 800/377-3000 © Insight Direct Inc 5/16/95

America's Discount Source for Computers, Hardware and Software.

BETTER

■ Order 24 hours a day, seven days a week ■ "Worry-Free" Money-Back Guarantee ■ *Computer Shopper Best Buy Award* for Hard Drives 7 straight years. ■ If you don't see what you need, Call! ■ *PC Magazine Editor's Choice Awards* for hard drives and Insight Computers. ■ Hundreds of Sales Representatives, Technicians, and Customer Engineers to assist in your purchase and continued support.

FASTER

■ Same Day Delivery available ■ Fully automated Federal Express delivery ■ 24-hour delivery on our prebuilt systems ■ Most in-stock items delivered the next business day ■ Call our Fax On Demand Service at 800-755-9654 or dial up our BBS at 602-902-5929 ■ Reach us on the Internet! For an Internet automated response, how to get information on prices, ordering, etc., email to info@insight.com

FedEx

CHEAPER

■ If you find a better price, call us before you buy. ■ Toll-Free Tech Support. ■ Our tremendous buying power means savings to you. ■ Wide range of payment options including low cost leasing. ■ Use your Insight Credit Card — no down payments. No annual fee ■ Call for your copy of our NEW Insight catalog – A shopper's paradise – FREE!

800-998-8030

Insight®

CIRCLE 219 ON READER SERVICE CARD

PICK UP TONS OF VALUABLE COMPUTER INFORMATION...

...WITH ONE HAND.

Take 75,000 articles from over 160 computer publications. Add 75,000 product specs. Then mix in over 13,000 company profiles. If you gathered that together by yourself, you'd need a forklift — and a lot of strong shelves. Or get immediate access to all of it, updated monthly on CD-ROM. Only with Computer Select.

Be an automatic expert. Get Computer Select, the ultimate information source for the industry that's always changing. Lighten your load today!

ONE MONTH FREE WHEN YOU SUBSCRIBE

COMPUTER LIBRARY

CALL: 1-800-827-7889 COMPUTER SELECT

ext. 5203

CIRCLE 158 ON READER SERVICE CARD

Offer good in the U.S. and Canada only. Outside the U.S. and Canada: 1-212-503-4425

©1995 Information Access Company. Computer Select is a registered trademark and Computer Library is a trademark of Information Access Company. A Thomson Corporation Company. All rights reserved.

PC MAGAZINE MARKETPLACE INDEX

Premier
The color showcase that puts the spotlight on leading-edge PC products and services.

355-369

Classified
Flexible-format display advertising: computer systems, components, software and more.

370-383

BusinessCard
A forum for innovative, hard-to-find and low cost PC hardware, software and services.

384-386

HARDWARE	PREMIER	CLASSIFIED
Batteries		
Boards/Components/Chips	356	370
Communications	357	
Computer Systems	358	372
Input/Data Acquisition/Barcode/POS	359	373
Mass Storage Devices	359	
Multimedia	361	
Music/Midi	362	
Networking	362	
Peripherals	365	
Power Supplies		
Printers/Print Devices	367	
Security		
Video		

SOFTWARE	PREMIER	CLASSIFIED
Barcode		
Business Applications	365	376
—Single-Solution		
Business Utilities		369
CD-ROM Titles		376
Cellular Phones		376
Communications		377
Data Entry		
Database		
Desktop Publishing		
Education	367	377
Entertainment/Games		
Financial/Accounting		
Foreign Languages/Font/Translation		377
Graphics/Design/CAD	368	377
—Digital Output Service		
Health/Fitness/Nutrition		
Human Resource		
Mailing List Management		
Manufacturing/Inventory		
Mapping/Demographic		
Medical/Dental		
Multimedia	369	
Music/Midi		
OS/2		
Personal	365	
Programming Tools/Languages		
Real Estate		
Religion		
Scientific/Engineering		
Security		377
Shareware/Public Domain		
Statistical/Research		
Utilities		
Windows		
Adult		381

SERVICES	PREMIER	CLASSIFIED
Computer Insurance		
Data Conversion/Data Recovery		379
Desktop Publishing		
On-Line	369	379
Scanning Services		
Software Duplication		379
Training/Tutorial		

MISCELLANEOUS	PREMIER	CLASSIFIED
Accessories		
Books/Catalogs		
Business Opportunities		380
Career Opportunities		
Supplies	366	381

WE WILL BEAT ANY ADVERTISED PRICE!

PACIFIC COAST MICRO INCORPORATED

Fax (619) 581-0125
Cust. Svc. (619) 581-1439

4901 MORENA BLVD., SUITE 111 • SAN DIEGO, CA 92117

CALL TOLL FREE 800-581-6040

P.O.s accepted from Universities and Qualified Firms. No surcharge on credit cards

PC Mag 3.3.95

SIMMS
ALL SPEEDS AVAILABLE
1X3-70 $88
1X36-70 $156
1X9-70 $40
2X36-70 $319
4X9-70 $190
4X36-70 $499
16X9-70 $579
8X36-70 $1080
PRICE ON 70 NS

CALL FOR THE BEST PRICES ON:
Video Cards • Controller Boards
Tape Drives • CPUs • Math COs
and Much More!

800 TOLL FREE CUSTOMER SERVICE
TECH SUPPORT
FAX ON DEMAND

MOTHERBOARDS

SUPER MICRO P90 PCI / P75 / P100
2mg to 128 mg 4-72 pin Simms 512K Cache 4 PCI, 1 Vesa 5 ISA, 75, 90, 100 Selectable 8 1/2"x13

P75	$ 619
P90	949
P90 W/O CPU	279
P100	1159

Byte Magazine — "Best Overall" and PC Magazine — "Editor's Choice Award"

INTEL 486 VLB
3VL 5 ISA Slots, Ami Bios, Opti Chip Set, Ziffsocket, 256 K-Cache

486 DX-33	$219
486 DX2-66	279
486 DX4-100	419
486 DX W/O CPU	95

PENTIUM PCI
3 PCI-5 ISA Slots, Intel Mercury Chip Set, Phoenix Bios, Ziffsocket

586 P60	$519
586 P66	549
Pentium Board W/O CPU	195

CYRIX 486 VLB
3VL, 5 ISA Slots, Ami Bios, Opti Chip Set 256 K-Cache upgradeable to 486 DX CPU
486 DLC 40 VLB w/CPU $185

SCSI DRIVES

CONNER	CFP1060S	1.0GB	9MS	479

SEAGATE BARRACUDA 1 MG CACHE, 7200 RPM, SCSI 2 FAST

ST12550N	2.1GB	8MB	$1156
ST31200N	1GB	9MS	499

IDE HARD DRIVES

2 Year Warranty — Maxtor

MODEL	SIZE	SPEED	TYPE	PRICE
7420	420MB	10MS	3.5" IDE	$179
7540	540MB	11MS	3.5" IDE	219
7850	850MB	11MS	3.5" IDE	255
71260	1.26GB	11MS	3.5" IDE	385

2 Year Warranty — CONNER

CFA420A	420MB	12MS	3.5" IDE	$173
CFA540A	540MB	11MS	3.5" IDE	180
CFA850A	850MB	10MS	3.5" IDE	270
CFA1275	1.2GB	10MS	3.5" IDE	389

2 Year Warranty — Seagate

ST3660	540MB	12MS	3.5" IDE	$199
ST3780A	780MB	10MS	3.5" IDE	265
ST31220A	1.08GB	10MS	3.5" IDE	389

3 Year Warranty — WESTERN DIGITAL

1210	210MB	13MS	3.5" IDE	$149
2420	420MB	12MS	3.5" IDE	179
2540	540MB	10MS	3.5" IDE	209
2700	700MB	13MS	3.5" IDE	255
2850	850MB	10MS	3.5" IDE	275
AC31000	1Gig	10MS	3.5" IDE	389

2 Year Warranty — Quantum

LPS 540A	540MB		3.5" IDE	$212

MANY OTHER PRODUCTS AVAILABLE!

LOW COST SHIPPING RATES AVAILABLE HOURS: MON-FRI 7AM-5:30PM P.S.T. SAT. 10AM-1:30PM P.S.T.

Shipping is non-refundable • No cancellations on special order items • 20% Restocking fee on refunds within 30 days • No returns after 30 days • Warranty replacement only • All prices final • Prices subject to change

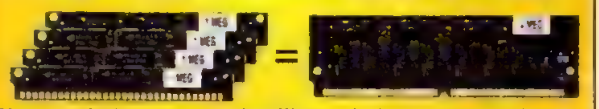
CIRCLE 751 ON READER SERVICE CARD

$ SAVE *BIG* BUCKS ON MEMORY $

Don't throw away your PC or MAC memory - Let us convert it for you!

Don't buy expensive 72 pin SIMMs before you contact US

Convert four 1 Mb 30 pin SIMMs to one 4 Mb 72 pin SIMM - $40



You provide the memory and we'll provide the conversion solution.

1, 2 Meg 72 pin conversions ... $ 20.00 / $ 32.00
4, 8 Meg 72 pin conversions ... $ 40.00 / $ 60.00
16 Meg 72 pin conversion .... $ 70.00
32 Meg 72 pin conversion ... $125.00

Autotime leads the way in DIP, SIP, ZIP and Surface Mount to SIMM conversions.

FREE Product/Service Price Catalog Available 24 Hours
AutoFAX: (503) 452-4266 Internet: info@autotime.com

AUTOTIME
6605 SW Macadam Ave
Portland, Oregon 97201
PHONE: (503) 452-8577
FAX: (503) 452-8495

VISA

CIRCLE 752 ON READER SERVICE CARD

ROM BIOS UPGRADES

Do you need new AMI, Award, MR BIOS or Phoenix BIOS?

Support Windows 3.1/Chicago
Support 1.2/1.44/2.88MB Floppy Drives
User defined hard drive types
Enhanced IDE
100% IBM compatible
Hard drive support beyond 1K cylinders
32 bit block mode transfer
Four floppy support
Four serial port support
DOS 6.X
Three levels of password protection
Complete set up in ROM

WE ARE THE OLDEST AND LARGEST BIOS UPGRADER IN THE WORLD. GUARANTEED LOWEST PRICES ALL THE TIME.

ORDER TODAY!

1-800-800-BIOS

MA/FL/CA OFFICES (7467)
RETURNS MAY BE SUBJECT TO A RESTOCKING FEE

UNICORE SOFTWARE

1558 TURNPIKE ST • NORTH ANDOVER, MA 01845
(508) 686-6468 • FAX (508) 685-1650

ACER AMI AST COMPAQ DELL DTK IBM EPSON EVEREX GATEWAY HYUNDAI KAYPRO LEADING EDGE MACRONICS MICROMATE SAMSUNG SANYO SPERRY TANDY WELLS AMERICAN WYSE AND MANY MORE...

CIRCLE 755 ON READER SERVICE CARD

3981 E Miraloma Ave
Anaheim, CA 92806

6050 -X McDonough Dr
Norcross, GA 30093

SHECOM

1*800*366*4433

MEMORY

1M X 3 70ns	$37.00
1M X 9 70ns	$40.00
4M X 8 70ns	$119.00
4M X 9 70ns	$135.00
16MX 9 70ns	$545.00
1MX36 70ns	$155.00
2MX36 70ns	$310.00
4MX32 70ns	$430.00
4MX36 70ns	$525.00
8MX36 70ns	$1045.00
16MX36 70ns	$2225.00

We Stock
AST COMPAQ TOSHIBA
to
IBM NEC HP ZENITH
MEMORY

LASER PRINTER MEMORY

Deskjet 500,500C	2MB	$98
LaserJet 4 M/SI	4MB	$164
LJ 4P/4MP/4+	4MB	$148
SHARP JX9400,9460,9600	2MB	$205
PANASONIC KXP 4410,4430	2MB Ex	$127
EPSON EPL 4000,4000T	2MB Ex	$112
Action Laser 1500	2MB Ex	$104
OKIDATA OL 400e,410ex	2MB Ex	$122

1*800*872*6677

POs from Govt Corporate Schools & Univ. WELCOME

Prices are subject to change without notice.

WEST COAST

EAST COAST

CIRCLE 753 ON READER SERVICE CARD

GET THE MESSAGE - OR ELSE!

WINDOWS-BASED

- *Voice Mail*
- *Auto – Attendant*
- *Fax – On – Demand*
- *Packages from $295*

1-800-955-4884

(Developer/OME packages available) VISA ~ MC ~ AMEX ~ COD

Don't trade your life for a lost message!

TALKING TECHNOLOGY, INC.
1125 Atlantic Avenue, Alameda, California, 94501
Voice: 510-522-3800 Fax: 510-522-5556

CIRCLE 756 ON READER SERVICE CARD

US Computer

Your #1 Source For Computer Components & Systems!

KEYBOARDS

Discovery Enhanced 101 Click Keyboard	$ 19
[illegible] Click Keyboard	$ 28
[illegible]	$ 36
[illegible]	$ 43
[illegible]	$ 49
[illegible]	$ 89

HARD DRIVES

[illegible]		
[illegible]	3yr	$ 209
Western Digital AC720MB 720MB IDE 3.5"	3yr	$249
Western Digital AC850 850MB 3.5" IDE	3yr	$249
Western Digital AC31000 1.08GB IDE 3.5"	3yr	$299
[illegible]	2yr	$ 159
[illegible]	2yr	$ 165
[illegible]	2yr	$ 179
[illegible]	2yr	$ 189
[illegible]	2yr	$ 189
[illegible]	2yr	$ 199
[illegible]	2yr	$ 185
[illegible]	2yr	$ 169
[illegible]	2yr	$ 170
[illegible]	2yr	$ 189
[illegible]	2yr	$ 539
[illegible]	2yr	$ 599
[illegible]	2yr	$ 245
[illegible]	2yr	$ 189
[illegible]	2yr	$ 249

TAPE BACK UP

[illegible]	$ 149
CONNER 420MB internal Tape	$ 179
WANGTEK 5150 525MB internal	$ 250
WANG TEK 5525 1.3GB internal	$ 649
[illegible]	
[illegible]	$ 59
[illegible]	$609
[illegible]	$ 209

10 Watt Multimedia Stereo Speakers	$ 49
8 Watt Multimedia Speakers	$ 49

MITSUMI FX440 4X QUAD Speed IDE Interface	$179
SONY CD Rom FREE 2X Speed IDE Interface	$ 129
*NEC [illegible] Speed SCSI	$209
TEAC 6 PEPSI 4X Speed 14X AT Interface	$189
Creative Labs Double Speed Multi Kit	$ 275
[illegible]	
SOUND CARD 16 Jazz Mediavision 16Bit	$ 69
Creative Labs Sound Blaster Basic 16Bit	$ 79
Creative Labs Sound Blaster SCS-2 OEM	$ 125
Creative Labs Sound Blaster AWE32	$ 179

CD TITLES

Microsoft [illegible] Encarta/Money	$129
[illegible]	
Microsoft Encarta Encyclopedia	$ 99
New Grolier Electronic	$ 29
Iron Helix 3D	$ 29
Doom Expert CD Title	$ 29
International [illegible] Adults Only	$ 29

MEMORY

4x32 *8MB 70NS 72Pin SIMM	$449
4x36 16MB 70NS 72Pin SIMM	$509
2x32 8MB 70NS 72Pin SIMM	$ 299
2x36 8MB 70NS 72Pin	$ 325
1x32 4MB 70NS 72Pin SIMM	$ 169
1x36 4MB 70NS 72Pin SIMM	$149
4MBx9 70NS SIMM	$ 139
4MBx9 70NS 30Pin SIMM	$ 149
1MBx32 60NS IBM 30Pin SIMM	$ 45
1MBx9 70NS 30Pin SIMM	$ 45
1MBx9 70NS 30Pin SIMM	$ 45
[illegible]	
TEAC 1.44MB FDD	$ 36
*TEAC 1.2MB FDD	$ 45
*TEAC Dual Floppy 1.2/1.44MB FDD	$ 99

CONNER IBM [illegible] WESTERN DIGITAL

VIDEO CARDS

Trident 8900D SVGA 1MB	$ 69
*Trident 9440 SVGA VL 1280x1024 w/1-2MB	$ 79
Trident 9440 SVGA PCI 1280x1024 w/1-2MB	$ 89
CIRRUS Logic 5428 SVGA VL 1280x1024 w/1-2MB	$ 79
S3 SVGA PCI 1280x1024 w/1MB	$ 75
S3 SVGA VL 1280x1024 w/1-2MB	$ 76
Diamond Speedstar Pro SE VLB 1MB	$135
Diamond Stealth 24 w/1-2MB	$135
Diamond Stealth 32 VLB 2MB	$189
Diamond Stealth 64 VRAM PCI w/2MB	$279
Diamond Stealth 64 VRAM VESA w/2MB	$279
[illegible]	
PCI IDE Controller 2 HDD/2 FDD	$ 29
PCI SCSI [illegible]	$ 70
IDE I/O 2S 1P 16 ISA	$ 16
Enhanced VL Bus IDE I/O Controller	$ 33
[illegible]	
EIDE 2300 Plus VL 2 IDE 2HD 4FD w Super I/O 384	$ 69
4030VL 2 IDE 4HD FDC 16MB 512K Req	$115
420VL IDE VL Bus 1MB 2HD IDE	$115
4040VL-2 Bus IDE 4HD FDC 16MB 512K Req	$209
DC5030 PC IDE [illegible] 16MB 512K Req	$199

MODEMS

28.8 14.4[illegible]	$ 125
14400 BPS [illegible] Fax Modem OEM	$ 69
14400BPS Internal Fax Modem OEM	$ 59
[illegible]	
Pentium 100/90 PCI w/EIDE I/O 256K	$329
Pentium 66/60PCI/EIDE I/O 256K	$149
ALI 486DX/2,4 100MHZ PCI/VL 258K EIDE I/O	$129
PERCOMP 486DX4-100 256K OPTI 72/30 Pin	$ 99
BIOTEQ 486DX/2 3VL Bus 256K AMI/ZIFF 72/30 Pin	$ 95
[illegible]	
IBM 486SLC2-66 OPAL VLB 64K w/Math-Co 30Pin	$ 149
486DLC 40 w/Math-Co 128K 6 Slots	$ 129
486DX-40 w/Math-Co 128K 6 Slots	$ 99

CPU INTEL

Pentium 100MHZ	$ 139
Pentium 90MHz	$ 5[illegible]
Pentium 60MHz	$299
486DX4 100MHz	$289
486DX2 66MHz	$189
486DX-33MHz	$ 135
[illegible]	
486DX4 [illegible]0MHz	$239
*486DX2 80MHz	$159
486DX2-66MHz	$149
486DX-40MHz	$ 125
[illegible]	
486DX4 [illegible]0MHz	$149
4x[illegible] [illegible]MHz	$129
486DX 33MHz	$ 109
[illegible]	
386DX 40 PGA	$ 35
386DX 33	$ 35
387 33PLCC HT	
PQFP	$ 29
387 DLC40 PGA	$ 29

SPECIALS

INTEL PENTIUM 90Mhz 256K PCI/VESA W/CPUS849	
INTEL 486DX 256K EISA 8 SLOTS	$159
PERCOMP 486DX2-80 W/ CPU 3VL BUS 256K	$249
PERCOMP 486DX2-66 CPU 3VL BUS 256K	$209

CALL FOR SYSTEM CONFIGURATIONS AND 2 YEAR WARRANTY!

Order 24Hrs Via Fax at 714 841 4262
[illegible] 7509

California & Colorado Office Hours:
Mon - Fri 8:30AM - 6:00PM
Sat 10:00AM-4:00PM

Colorado
[illegible]

California
[illegible]

Cyrix mag Quantum

US Computer **1.800.787.4947** California
1.800.683.6613 Colorado

*All Brand Names are Registered trademarks of their respective companies *Prices & Specifications are subject to change without notice

CIRCLE 754 ON READER SERVICE CARD

Lose 500 pounds in 10 minutes

with a Rose keyboard monitor switch

Call today for free catalog

- Print servers
- Data switches
- Keyboard/video control

Streamline your computer room by reducing excess equipment. Access up to 256 CPU's from a single keyboard, monitor, and mouse. ServeView is our best-selling switch, has every feature you can imagine, and installs in minutes. Compare price, features, performance, quality, and support and you'll find Rose can't be beat.

P.O. Box 742571 ◆ Houston, Texas 77274
TEL 713/933-7673 ◆ FAX 713/933-0044

Call us to discuss your application or to receive your free information kit.

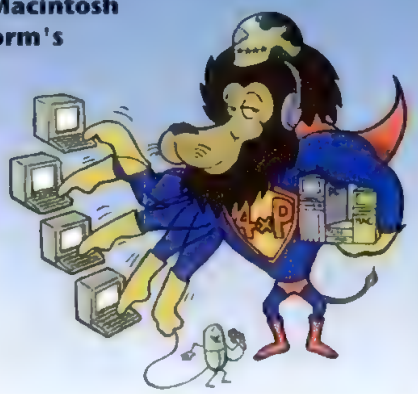
ROSE ELECTRONICS

CIRCLE 757 ON READER SERVICE CARD

SEE US AT SUN WORLD, SAN FRANCISCO MAY 23-25 BOOTH#1202

Up to 4 Users can Access Multiple PC, Macintosh and Sun Computers from a Central Location!

- **Multiuser** — **Up to 4 users can access different computers simultaneously!**
- **Multiplatform** — **Supports any combination of PC, Macintosh and Sun computers. Use any platform's peripherals to access any type of computer in the system.**
- **Multimedia** — **Every user has full multimedia capabilities; keyboard, mouse, video, speakers, microphone and high speed serial port available.**



AUTOBOOT COMMANDER 4xP™

PC is a trademark of International Business Machines Corporation. Macintosh is a registered trademark of Apple Computer, Inc. Sun is a trademark of Sun Microsystems. Cybex, Commander, AutoBoot, and 4xP are trademarks of Cybex Corporation.

Cybex Corporation
4912 Research Drive Huntsville Al 35805 USA
(205) 430-4000 (205) 430-4030 fax

CYBEX™

CIRCLE 758 ON READER SERVICE CARD

PREMIER

NEW 11.3" Screen, 100MHz NoteBrick

The Old Beige Desktop Ain't What It Used To Be

$3,395

- 100MHz Intel 486DX4
- 11.3" 800x600 DSTN Color LCD
- 525MB Hard Disk (max.1.0GB)
- 12MB RAM (max. 32MB)
- 14-14 Fax/Modem
- Audio and Speech Recognition
- 4-Year GE Warranty

Who says a notebook could never replace a desktop? Just one look at the new Ergo Big Screen NoteBrick might send your ole beige out to pasture.

Enjoy a 11.3" 800x600 Color LCD with nearly the same viewable area as a 14" SVGA monitor; snappy performance with the latest Intel 100MHz 486DX4; a comfy, full-sized keyboard; and the mobility of a 6.5lb. notebook. Other features include 8–32MB RAM, accelerated local bus graphics, giant hard disks with 525MB, 810MB or 1.0GB capacity.

A 14-14 PCMCIA Fax/Modem and two Type II/one Type III ports are standard. Optional are a 28.8 Fax/Modem and a quick connect/disconnect port replicator.

The NoteBrick is one of a complete line of high-performance notebooks and Pentium desktop PCs from Ergo. All Ergo systems feature a 4-Year GE Warranty, 15-Day Money Back/60 Day Exchange Satisfaction Guarantee, same day shipment of popular models, and optional RescueMe Next Day Loaner backup.

To order or for info, call: M-F, 9-7 EST
1-800-633-1925

24Hr. Automatic FAX info, code 1205
1-800-723-0778

Ergo COMPUTING

Ergo Computing, Inc., One Intercontinental Way, Peabody, MA 01960 (508) 535-7510 Fax: (508) 535-7512 - ERGO U.K., (0) 602 452565

CIRCLE 760 ON READER SERVICE CARD

SPEECH MASTER

Does It All

VOICE MAIL
ATTENDANT
AUDIOTEX
FAX
OUTCALL
SpeechBASIC

2 lines w/ board
Manual + Demo $75

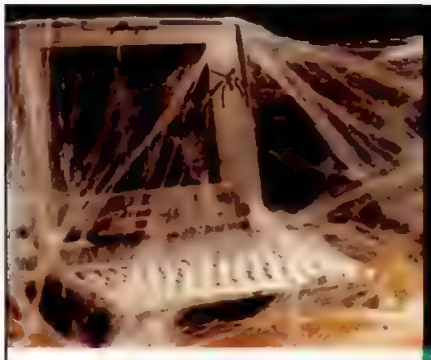
SPEECH MASTER™ is the award winning All-In-One speech application solution. This industry leading full-featured high capacity package is easy for everyone to use. No programming required and all components work together seamlessly for out of the box, ready to go applications. Now with SpeechBASIC™ for ultimate power!

Speech Master software comes in sizes to control up to a maximum of 2, 4, 12, 24, or 32 individual telephone lines via the PC communication boards. The PC boards come in sizes to control 2, 4, 12, or 24 physical telephone lines, and can be mixed in any manner to achieve the desired line-capacity.

SPEECH SOFT

SpeechSoft, Inc.
800-878-8117
32 Manners Road, Rangoes, NJ 08551
(609) 466-1100 sales (609) 466-0757 Fax

CIRCLE 759 ON READER SERVICE CARD



Old before its time?

Don't replace – upgrade!

Now you can get the hard drive capacity and processor power you need . . . at a fraction of replacement cost. We upgrade Toshiba, Compaq, and most other brand name portables without adding bulk or weight. **If you're feeling the applications squeeze, call us.** You'd be surprised how much life there's left in your laptop . . .

LS LAPTOP SOLUTIONS • INC

* All upgrades performed and tested at LSI *

All product names are trademarks or registered trademarks of their respective owners

Laptops up to 4.4 GB

Notebooks up to 810 MB

486 Clock Doubled Power for 386 Portables

PLUS Repairs and Service

(800) 683-6839

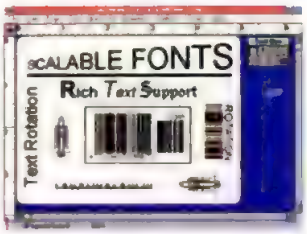
10700 Richmond Ave., Suite 114
Houston, Texas 77042
(713) 789-0878
Fax (713) 789-8177

CIRCLE 761 ON READER SERVICE CARD

COMPUTER SYSTEMS

The Next Generation in Label Design Software

LabelWorks™ for Windows



LabelWorks sets the new performance standard for professional quality label design. No other program combines such easy operation with this much power!

- Provides Desktop Publishing features to enhance label design. Features include: WYSIWYG, rulers, guides, page zooms, lines, shapes.
- Rich text support allows you to edit font styles types, and sizes within the same line.
- Supports all major Bar Code symbologies, including Code 39, 93, 128, POSTNET, UPC, Bookland EAN 19 types in all.
- Imports & Exports using TIFF, GIF, BMP, PCX, WPG, WMF, TARGA graphic files.
- Rotates Text, Bar Codes and imported graphics in 90 degree increments.
- Prints labels on virtually any windows supported printer.
- Prints labels directly from dBase, DIF & ASCII files.

Dealer Inquiries Welcome.

Call for Free DEMO Software

AMERICAN MICROSYSTEMS
2190 Regal Parkway, Euless, TX 76040
(800) 648-4452 (817) 571-9015 FAX (817) 685-6232

THE BEST TAPE BACKUP SYSTEM!

Announcing the SD420 from Secured Data, the only truly portable and rugged tape backup system. Tough enough to protect your data, and powerful enough to quickly and accurately backup and restore your data.

- 420MB storage with compression
- QIC-80 compatible
- Easily plugs into any parallel port, full EPP capability
- Built-in handle for easy handling
- SecureWare for DOS, Windows
- Built-in power supply, with a detachable power cord
- Free Sony QIC-Wide 5122 preformatted minicartridge
- 30-day money back guarantee and 2-year warranty

When you find yourself between a rock and a hard place...

1-800-344-3060
303-254-8387 FAX

SECURED DATA

THE ONLY SECURE THING IS YOUR DATA

CIRCLE 763 ON READER SERVICE CARD

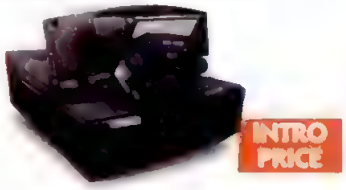
NEW! Three for the show.

An Inc. 500 Company

COLORSHOW 2000. $3,999

Affordable color! Our most popular product just got even better. Better wall-sized true-color projection at the same unbeatable price. The BOXLIGHT ColorShow 1200 is our best seller for a good reason - value!

The ONLY "all-in-one" LCD data projector priced under $4,000 is now available exclusively from BOXLIGHT! The sleek, compact design offers unobtrusive operation in the boardroom and folds for ultimate portability. The bright STN technology delivers rich brilliant color from your PC or Mac. If the convenience and performance of an integrated projector is right for you, the ColorShow 2000 is unbeatable.



- Sleek, compact and stylish design
- Compatible with PC or Mac
- Less than 20 lbs. travel weight
- Includes free remote control
- Optional Computer Control Wand

BOXLIGHT 1200. $2,299

- 24,389 vibrant colors
- Universal PC and Mac compatibility
- Compact, portable design
- FREE remote control and cables
- Brightest color at any price
- Now with faster mouse response!

Active-matrix Color at a passive matrix price! TFT 24-bit processing for photo-realistic color in an under $3,000 panel! Fast-changing meetings require the speed of active-matrix technology. BOXLIGHT's best-selling ProColor is the choice of hundreds of our Fortune 1000, Government and Higher Education customers, like YOU!

PROCOLOR 1300. $2,999

- 16.8 million color palette
- Lightweight, reliable and rugged design
- PC/Mac compatible upgradeable to video
- Multimedia model 1500 only $3,799!

BOXLIGHT: Your direct source for all the bright answers.

- More than 50 models in stock
- Instant availability
- Overnight shipping
- 30-day guarantee and extended warranties
- Expert technical support

No one else offers the one-stop shopping... the selection... the value...the immediate delivery... and the knowledgeable service and support you get from the projection panel experts.

The Inc. 500 logo is a registered trademark of Goldhirsh Group, Inc.

BOXLIGHT™ CORPORATION

17771 Fjord Dr. N.E., Poulsbo, WA 98370 • 206/779-7901
Payment VISA, MasterCard, American Express, COD and Purchase Orders some restrictions Leasing and rental options available 30-Day Money-Back Guarantee

10th ANNIVERSARY

Call today 1-800-762-5757

Government Sales 1-800-497-4009 • Reseller Sales 1-800-736-6956

CIRCLE 762 ON READER SERVICE CARD

9 TRACK/3480/CDROM

WINDOWS DOS NOVELL OS2 UNIX

WINDOWS TAPE SOFTWARE!
TAPE BACKUP/CONVERSION
TAPE DUPLICATION
CD ROM MAKER

LAGUNA DATA SYSTEMS
7340 Smoke Ranch Road Suite C,
Las Vegas, NV 89128
TEL: (702) 254-2648 FAX: (702) 254-0910

800-938-TAPE

CIRCLE 764 ON READER SERVICE CARD

9-TRK/3480/3490(IDRC)/3490E(36 Track)

FOR PC SUN RS6000 AS400 DEC HP SGI and more!

GET THE BEST SERVICE,SUPPORT, PRODUCT AND PRICE WITH

CHI CORPORATION

Now all of the features of the PCTD product family that earned PC Magazines' praise: — "has an excellent nine-track tape system for PCs".
Frank Derfler, Jr., PC Magazine July 1992.

Complete Subsystems Available for 9 18 36 Track, 4mm, 8mm and DLT Tapedrives

Software Features:
- DOS and Windows software for PCs
- Data extraction and conversion software
- Back-up & Restore, Import & Export, Programmers Interface
- Tape Copy Utility and More

NEW!
- 100& 150 Cartridge CD-Rom Jukeboxes
- 4xS CD Rom reader/writer with software for Windows
- 101GB read/writeable optical jukebox

CHI Corporation
31200 Carter St

800-828-0599
Fax: 216-349-8609

CIRCLE 766 ON READER SERVICE CARD

MAC SUN UNIX DOS WINDOWS AIX OS2

3480 3490

Your Tape Connection Source

- ✔ Best Product
- ✔ Best Price
- ✔ Most Reliable
- ✔ 1 year Onsite Warranty

Featuring FUJITSU Quality Products

(800) CPU-3480

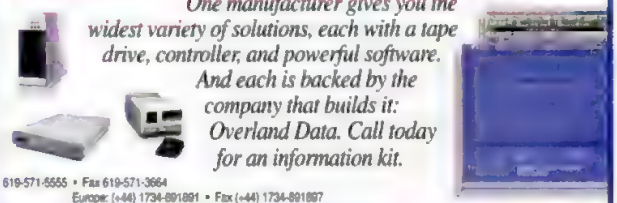
Computer Peripherals Unlimited Inc.
2355 N. Steves Blvd., Suite C • Flagstaff, AZ 86004
(520) 526-2261 Phone • (520) 773-9183 Fax

3480 3490 3490E 9-Track 8mm 4mm

Plug & Play Solutions For PCs

9-Track, 3480, 3490, 3490E

One manufacturer gives you the widest variety of solutions, each with a tape drive, controller, and powerful software. And each is backed by the company that builds it: Overland Data. Call today for an information kit.



619-571-5555 • Fax 619-571-3664
Europe: (+44) 1734-891891 • Fax (+44) 1734-891897
Email: odsales@overland.com • ftp://overland.com/pub/odsales
Web: http://www.overland.com/~odsales

800-729-8725

Overland Data

CIRCLE 767 ON READER SERVICE CARD

MACWORLD MW EDITORS' CHOICE

WORLDS SMALLEST PORTABLE

PC WORLD BEST BUY

Battery, PS, Charger, & Parallel/SCSI all inside.
Mac and IBM (works on both) No cards needed!

NEW! New 1.4 Gig

1.4 Gig. Drive, 9 ms
- SCSI-2
- 1.5-3 hr battery life
- Battery inside
- Power supply inside
- SCSI to Printer port inside
- 270,340,525, &1080 MB available

"Editors' Choice"

See us at Windows Solutions in S.F. Sept. 7-9, booth 1613

NEW! 4.2 Gig

700MB-4.2Gig HD 8ms

1.3 Gig Optical, 39ms. or 1.3 Gig. at 23ms, 225 series

NEW! SYQUEST Removable 270 MB

270 MB Syquest; 270MB on a 3.5" disk cart., fast 13ms access time. Great for graphic image storage and fast enough for MPC presentations. Unlimited storage/ backup at hard drive speeds. Backward compatible.

HOTTEST CHOICE!!

2-16 Gig DAT, 160MB Tape, or 600MB Tape.

Fastest!

CD-ROM, PhotoCD Multi-Session 200ms. Fast, Light & Portable. Battery Option.
"Best Solution"PC MAG2/94

NEW! RAID

2-8.4 Gig. RAID, 5ms Raid level 1 or 0.

128/230MB 3.5" Cartridge, Read/write Optical.

Syquest 200

200MB Syquest Cartridge Drive, 18ms, reads and writes 44MB and 88 MB Cartridges.

Liberty Systems

375A Saratoga Ave.
San Jose, CA 95129

(408) 983-1127
Fax (408) 243-2885

CIRCLE 765 ON READER SERVICE CARD

DATA SOLUTIONS YOU CAN DEPEND ON

9-TRACK/3480/3490/3490E

✓TAPE BACKUP
✓DATA CONVERSION
✓TAPE DUPLICATION

REMAX ELECTRONICS, INC.
3960 BEAU D'RUE DR. EAGAN, MN 55122

TEL: (612) 686-0015
FAX: (612) 452-3235

800-396-6116

CIRCLE 768 ON READER SERVICE CARD

Will your 9-Track Subsystem....

- ✔ Offer tape speeds from 100 to 150 ips?
- ✔ Read and Write all four 9-Track Densities?
- ✔ Work in concert with other SCSI-2 devices?
- ✔ Be backed by a company who has produced 9-Track drives for over 20 years?

Features like these make *M4's* solutions the only choice for your demanding high performance applications.

....3480/90 Solutions also in-stock

M4

10855 Sorrento Valley Rd. San Diego, CA 92121
619-597-0516 Fax: 619-597-0936

800-240-8270
8 AM Eastern to 5 PM Pacific

CIRCLE 769 ON READER SERVICE CARD

Tape Solutions

...The Tape Experts

• 9 TRACK
• 3480 • 3490 • 3490E
• LIBRARIES

Qualstar Corporation
6709 Independence Avenue
Canoga Park, CA 91303

FAX (818) 592-0116 TEL (818) 592-0061
(800) 468-0680

CIRCLE 770 ON READER SERVICE CARD

YES! YOU CAN TAKE IT WITH YOU!

NOW YOU CAN HAVE FULL PORTABILITY AND SECURITY FOR YOUR VITAL DATA!

▶ The dataport removable storage module is the perfect solution. It provides security, portability, on-line backup, and hot-removability for raid operations.

- FORMFITTED FOR STANDARD 5.25" HALF HEIGHT BAYS
- ACCEPTS ALMOST ALL HALF HEIGHT 3.5" DRIVES
- EASY INSTALLATION

US PATENTS-
RE:#34,349 DES.#300,852

CALL TODAY!
1-800-260-9800

CRU-DATA
CONNECTOR RESOURCES UNLIMITED — INC —

CIRCLE 771 ON READER SERVICE CARD

MULTIMEDIA AUDIO

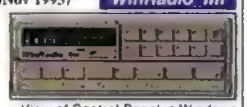
TWIN SOUND
Slip-In Stereo Speaker

- Fits any unused 5 1/4" PC drive bay
- 100% shielded high quality speakers
- Works with all sound cards & CD-ROMs
- No messy desktops
- FCC Class B certified

"...Twin Sound has to be one of the most practical and intelligent PC hardware products...in a long time. This is a wonderful product whose time has come."
(PC Review Oct/Nov 1993)

WinRadio .fm

Super Deal
Dealers Welcomed. both for
$89
(Plus $6.95 S&H)



View of Control Panel in Windows

- Plug-in digital FM Radio Card
- Runs under Windows and DOS
- 10 Preset Channels
- Auto Scan/Fine Tuning
- Wake-up and Sleep Functions

1-800-832-7070
Each sold separately at $49.95.

SOUND MiNDS Technology Inc.
1600 Dell Ave. #5, Campbell, CA 95008
Ph. (408) 374-7070 Fax: (408) 374-7193

Email orders:
Internet: smtct@ix.netcom.com
C'serve: 74643,2415@Compuserve.com

CIRCLE 772 ON READER SERVICE CARD

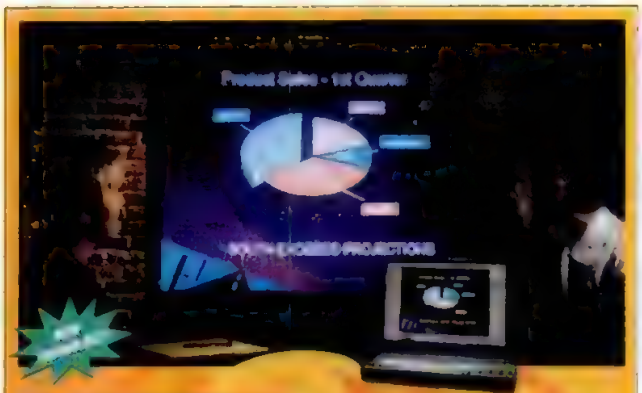
TV ELITE...The Complete Presentation System!

FREE REMOTE + MOUSE $179 Value

The leader in Big Screen Presentations just got better! TV Elite connects to any video capable TV in just seconds and produces excellent quality VGA to TV conversion for business meetings or multimedia presentations. TV Elite includes, "TV TOOLS" with 65 on screen tools such as ZOOM, DRAW, SPOTLIGHT, BREAK TIMER and "SLIDE WORKS" the ultimate in quick and easy slideshows. TV Elite now ships with the TV Elite REMOTE + MOUSE a Windows remote control mouse a $179 value FREE!

(800) 888-5244
Advanced Digital Systems • (310) 926-1928 • FAX (310) 926-0518

CIRCLE 773 ON READER SERVICE CARD



Presenter . . .

Connect Your PC To Any TV For Better Presentations

"Video quality ranks among the best we've seen from a portable scan converter." —Windows Sources, January 1995

Consumer Technology's "New technology makes Windows rock-solid on TVs." —InfoWorld, Brian Livingston

For information and a dealer near you, please call
800/356-3931

Consumer Technology Northwest Inc.
7853 SW Cirrus Drive
Beaverton, Oregon 97008
503.643.1662

The Presenter 3 - $349 SRP
For DOS and Windows, supports 16.7 million colors

The Presenter Sound 3 - $429 SRP
All the features of Presenter 3 plus Windows sound

MADE IN THE USA

cica CDROMS!

Call for your FREE catalog!

Cica MS Windows	Two disc set! 1072 MB New Windows programs.	$ 29.95*
	Includes: games, utilities, drivers, code, fonts, shells, etc.	SUB $19.95
Slackware Linux	Two disc set! Slackware 2.2 distribution of Linux, install from CDROM. XFree86 3.1 Tcl/Tk, GCC, "DOOM™"	$ 39.95 SUB $24.95
Simtel MSDOS	Two disc set! 10,000 MSDOS files. Utilities, comm, games, BBS programs, programming tools, source.	$ 34.95* SUB $19.95
FreeBSD Version 2.0	Berkeley BSD 32bit O/S for PC, w/ GNU & X11. XFree86 3.1, USENET, C++ compilers, source code!	$ 39.95 SUB $24.95
Hobbes OS/2 Archived	600 MB current Shareware/Freeware for OS/2	$ 29.95*
Hobbes Ready-to-Run	Installed OS/2 emacs, GCC, 2.1 service pack & more!	$ 39.95
Giga Games 2	3000 hot games for MSDOS and Windows -'95 edition!	$ 39.95*
Linux - Plug-and-Play	Yggdrasil Linux 32bit O/S for PC + 32 page booklet.	$ 34.95
C Users' Group Library	A collection of user supported C source code	$ 49.95*
QRZ! Ham Radio	FCC callsign database for Win & DOS + files	$ 29.95*
Gifs Galore	6000 mostly 640x480 GIF Images in every catagory	$ 39.95
Clip-Art Cornucopia	5050 B&W clip art images, PCX and WPG format	$ 39.95
Project Gutenberg	Classic literature and historical documents	$ 39.95
Source Code	650 MB of Unix & DOS source code for programmers	$ 39.95
Internet Info	Thousands of computer, net, and Internet documents	$ 39.95
Science Library	Largest collection science software, Win & DOS + Book!	$ 39.95
Ada	Two disc set! Programming tools, source code and docs	$ 39.95
Space and Astronomy	Thousands of NASA images and data files	$ 39.95
Ultra Mac-Utilities	630 MB of Mac utilities: fonts, games, graphics, PowerPC	$ 39.95*
Doom 1 Shareware	#1 VR game, 3-D graphics, fast & brutal action	$ 9.95*
Toolkit for Doom	500 levels for registered Doom 1 & 2, editors, hints!	$ 19.95
Fractal Frenzy	2000 high resolution fractals - plus royalty-free images	$ 39.95
CDROM Caddies	Standard type, highest quality, lifetime guarantee!	$ 4.95

* Shareware programs require separate payment to authors if found useful.
* Subscriptions: we ship new version to you automatically, update *about* quarterly.
Shipping costs: $5 US/Can/Mex $9 overseas • Distributors Welcome!

ORDER NOW! 1-800-786-9907
+1 510 674-0783 • Fax +1 510 674-0821 • Email: info@cdrom.com

Walnut Creek CDROM
Suite D-514, 4041 Pike Lane • Concord CA 94520 USA

All our CDROMs are unconditionally guaranteed.
Adcode: 514

CIRCLE 774 ON READER SERVICE CARD

Take Up Weightlifting Or Take Advantage.

Turtle Beach Audio Advantage™... $159.00 PCMCIA Sound Card.

Put "portable" back into the portable presentation. With the Audio Advantage™ PCMCIA sound device, you simply snap the card into place, plug in suitable speakers or headphones, and in seconds your multimedia presentation is ready to go with the highest quality sound.

See your favorite dealer, or call **800-645-5840** for more information today!

TURTLE BEACH SYSTEMS

[illegible]umbacher Road • York, Pennsylvania 17402
(717) 767-0200 • FAX (717) 767-6033

CIRCLE 775 ON READER SERVICE CARD

Turbocharge your modem connections with. . .

TurboPort

TurboPort/RA™ controllers

Delivering fast, reliable connections for high-speed modems, TurboPort serial I/O controllers supply the speed you need for remote access. Supports Windows, NetWare, OS/2 and more.

Faster than standard serial ports

Supports data rates up to 460.8K bps—4 times faster than V.34 modems

Maximizes modem speeds

Software-configurable. Offers automatic software/hardware flow control. Each port serviced by a 16C650 UART. For ISDN terminal adapters or modems of all types—9600 bps, 14.4K bps, 28.8K bps and above.

Multiple-strike surge protection

The only serial board for remote PC users with complete ESD protection to every signal.

For more information, call 1-800-782-7428

VISA and MasterCard accepted

See us at Spring Comdex Atlanta, GA
April 24-27 Booth#1906

STAR GATE TECHNOLOGIES INC.

Star Gate Technologies, Inc
29300 Aurora Rd. • Solon, OH 44139 USA
216-349-1860 • Fax 216-349-2056

DGI

CIRCLE 777 ON READER SERVICE CARD

It's easy to get attached to your notebook.

PCMCIA or parallel port SCSI.

Now notebook PC users won't have to give up their favorite desktop peripherals. Adaptec connects virtually any notebook to virtually any SCSI peripheral including CD-ROMs, hard drives and tape drives. We have three kit products to customize your applications. The MiniSCSI™ Plus kit and the MiniSCSI EPP kit connect SCSI to your parallel port. The SlimSCSI™ kit is for PCMCIA connectivity. All three include software that is fully compatible with DOS and Windows. See your dealer or call

Quick, high-performance PCMCIA connections.

1-800-934-2766, ext. 2326.*

adaptec

I/O NOW MORE IMPORTANT THAN EVER.

*For information by fax, dial 1-408-945-2570, ext. 2326, request document nos. 24540 and 24560. ©1995 Adaptec, Inc. All rights reserved.
Adaptec, the Adaptec logo, IOware and SlimSCSI are trademarks of Adaptec, Inc. which may be registered in some jurisdictions. MiniSCSI is a trademark of Trantor Systems Limited, an Adaptec company.

CIRCLE 778 ON READER SERVICE CARD

FOR QUICKER RESPONSE
FAX TO
(609) 829-0692

Free Product Information

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 433 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

PC MAGAZINE

P.O. BOX 11804
RIVERTON, NJ 08076-9404

PC MAGAZINE **READER SERVICE CARD FREE INFORMATION**

IT'S AS EASY AS 1, 2, 3

1. Fill in your name and address and check off your answers to the nine research questions.
2. Circle the numbers on the card that correspond to the ads or articles you'd like more information about.
3. The literature will be mailed to you from the advertiser free of charge.

CIRCLE FOR FREE INFORMATION

Void after September 30, 1995

001 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016 017 018 019 020 021 022 023 024 025 026 027 028 029 030 031 032 033 034 035 036 037 038 039 040 041 042 043 044 045 046 047 048 049 050
051 052 053 054 055 056 057 058 059 060 061 062 063 064 065 066 067 068 069 070 071 072 073 074 075 076 077 078 079 080 081 082 083 084 085 086 087 088 089 090 091 092 093 094 095 096 097 098 099 100
101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200
201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300
301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350
351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500
501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550
551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600
601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650
651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700
701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750
751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800
801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850
851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900
901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950
951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999

1. **Do you work in a DP/MIS dept.?**
01 ☐ Yes 02. ☐ No

2. **Please indicate your company or organization's primary business activity:** (Check one)
01. ☐ Manufacturer Computer Equip., Computers, Software
02 ☐ Manufacturer–Aerospace
03. ☐ Manufacturer–Other
04 ☐ Systems House
05. ☐ Computer Consultant
06. ☐ Computer Retailer/VAR/VAD Distributor
07 ☐ Communications
08 ☐ Finance/Banking/Insurance/ Real Estate/Accounting
09 ☐ Education
10 ☐ Government
11 ☐ Government Non-Federal
12. ☐ Research and Development
13 ☐ Data Processing/Computer Service
14. ☐ Health/Medical/Legal Service
15. ☐ Engineering/Architecture
16. ☐ Agr./Const./Mining/Oil/ Transp./Utilities
17 ☐ Non-Computer Retailer/Dist.
18. ☐ Other Business or Service

3. **Please indicate your primary business function:** (Check one)
01 ☐ DP/MIS
02. ☐ Systems, Programming
03. ☐ Communications
04. ☐ Engineering
05. ☐ Res./Dev./Scientific
06. ☐ Accounting/Finance
07 ☐ Computer Consulting
08. ☐ Purchasing
09. ☐ Operations
10. ☐ Production
11. ☐ Education/Training
12. ☐ Marketing/Sales
13. ☐ Medical/Legal
14. ☐ Admin./Mgmt.

4. **Is your company a reseller?**
01. ☐ Yes 02. ☐ No

5. **For how many IBM PCs and compatibles do you specify brands of products:**
01 ☐ 10 or less 03. ☐ 26-99
02. ☐ 11-25 04. ☐ 100 or more

6. **Are there any PCs in your office?**
01. ☐ Linked to mainframe
02. ☐ Linked to mini
03. ☐ Networked together

7. **Please check the equipment currently installed at your location:** (Check all that apply)
01. ☐ IBM or Compatible PCs
02. ☐ IBM or Compatible Mainframes
03. ☐ IBM or Compatible Minis
04. ☐ Macintosh
05. ☐ CD-ROM
06. ☐ Windows

8. **Do you plan to buy any PC products?**
01. ☐ Now 03. ☐ In 7 to 12 months
02. ☐ In 4 to 6 months 04. ☐ No definite plans

9. **Number of employees in your entire company:**
01. ☐ 25 or less 03. ☐ 100-499 05. ☐ 1000
02. ☐ 26-99 04. ☐ 500-999

Name

PC 5/16-5

Title

Telephone

Company Name

Address

City State Zip

5. ☐ Please send me a one-year (22-issue) subscription to PC Magazine for $34 97 (U.S. price), all other countries add $36.00 for additional postage

In a Hurry? Fax This Card To 609-829-0692

READER SERVICE CARD FREE INFORMATION

1 Fill in your name and address and check off your answers to the nine research questions

2 Circle the numbers on the card that correspond to the ads or articles you'd like more information about

3 The literature will be mailed to you from the advertiser free of charge

CIRCLE FOR FREE INFORMATION

Void after September 30, 1995

001 002 003 004 005 006 007 008 009 010 011 012 013 014 015 016 017 018 019 020 021 022 023 024 025 026 027 028 029 030 031 032 033 034 035 036 037 038 039 040 041 042 043 044 045 046 047 048 049 050
051 052 053 054 055 056 057 058 059 060 061 062 063 064 065 066 067 068 069 070 071 072 073 074 075 076 077 078 079 080 081 082 083 084 085 086 087 088 089 090 091 092 093 094 095 096 097 098 099 100
101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150
151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200
201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250
251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300
301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350
351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400
401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500
501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550
551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600
601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650
651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700
701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750
751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800
801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850
851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900
901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950
951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999

1. Do you work in a DP/MIS dept.?
01 ☐ Yes 02 ☐ No

2. Please indicate your company or organization's primary business activity: (Check one)
01 ☐ Manufacturer Computer Equip., Computers, Software
02 ☐ Manufacturer–Aerospace
03 ☐ Manufacturer–Other
04 ☐ Systems House
05 ☐ Computer Consultant
06 ☐ Computer Retailer/VAR/VAD Distributor
07 ☐ Communications
08 ☐ Finance/Banking/Insurance/Real Estate/Accounting
09 ☐ Education
10 ☐ Government
11 ☐ Government Non-Federal
12 ☐ Research and Development
13 ☐ Data Processing/Computer Service
14 ☐ Health/Medical/Legal Service
15 ☐ Engineering/Architecture
16 ☐ Agr./Const./Mining/Oil/Transp./Utilities
17 ☐ Non-Computer Retailer/Dist.
18 ☐ Other Business or Service

3. Please indicate your primary business function: (Check one)
01 ☐ DP/MIS
02 ☐ Systems, Programming
03 ☐ Communications
04 ☐ Engineering
05 ☐ Res./Dev./Scientific
06 ☐ Accounting/Finance
07 ☐ Computer Consulting
08 ☐ Purchasing
09 ☐ Operations
10 ☐ Production
11 ☐ Education/Training
12 ☐ Marketing/Sales
13 ☐ Medical/Legal
14 ☐ Admin./Mgmt.

4. Is your company a reseller?
01 ☐ Yes 02 ☐ No

5. For how many IBM PCs and compatibles do you specify brands of products:
01 ☐ 10 or less 03 ☐ 26-99
02 ☐ 11-25 04 ☐ 100 or more

6. Are there any PCs in your office?
01 ☐ Linked to mainframe
02 ☐ Linked to mini
03 ☐ Networked together

7. Please check the equipment currently installed at your location: (Check all that apply)
01 ☐ IBM or Compatible PCs
02 ☐ IBM or Compatible Mainframes
03 ☐ IBM or Compatible Minis
04 ☐ Macintosh
05 ☐ CD-ROM
06 ☐ Windows

8. Do you plan to buy any PC products?
01 ☐ Now 03 ☐ In 7 to 12 months
02 ☐ In 4 to 6 months 04 ☐ No definite plans

9. Number of employees in your entire company:
01 ☐ 25 or less 03 ☐ 100-499 05 ☐ 1000 or more
02 ☐ 26-99 04 ☐ 500-999

Name

PC 5/16-5

Title

Telephone

Company Name

Address

City State Zip

5. ☐ Please send me a one-year (22-issue) subscription to PC Magazine for $34.97 (U.S. price). all other countries add $36.00 for additional postage

In a Hurry? Fax This Card To: 609-829-0692

FOR QUICKER RESPONSE FAX TO (609) 829-0692

Free Product Information

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS MAIL PERMIT NO. 433 RIVERTON, NJ

POSTAGE WILL BE PAID BY ADDRESSEE

PC MAGAZINE

P.O. BOX 11804
RIVERTON, NJ 08076-9404

CONTROL ALL YOUR PC SERVERS

FROM ONE KEYBOARD, MONITOR AND MOUSE

SAVE SPACE, CUT COSTS & CENTRALIZE CONTROL WITH 100% RELIABILITY

with *MasterConsole*®

- Models for 2,4,8,16 PCs Expand to 64
- Supports PS/2 Mouse & Serial Mouse, All Video
- Use your keyboard or front panel to select PCs
- Autoscan™ to Monitor All PCs

NEW! Hot-Key Commands

CALL TODAY!
(800) RCI-8090 Ext. 80
for our free information kit

RARITAN COMPUTER INC 10-1 Ilene Court

30-DAY MONEY BACK GUARANTEE FULL 1-YEAR WARRANTY

CIRCLE 778 ON READER SERVICE CARD

PCBoard BBS Software

Call 800.356.1686 for a free, fully operational 2-line demo copy!

Dial-up and Local/Network Access Included • Built-in Internet-UUCP, FIDO & .QWK based Netmail • Bulletins, Files, Surveys, Private & Group Chat • E-Mail, plus Public & Private Message Bases • ASCII, ANSI and RIP Graphics Supported • Includes a FREE Microsoft Windows E-Mail Client

Call our Support BBS at 801.261.8976 for a live demo!

PCBoard.
Clark Development Company, Inc.

CIRCLE 780 ON READER SERVICE CARD

Wireless Printing

NEW!

Share Printers Without Wires or a Network

GoPrint Wireless Printer Sharing

GoPrint is as fast as printing through a wired connection and faster than printing over a network. GoPrint saves you the cost of wiring and installing an expensive network. And, since GoPrint is plug-and-play ready, in minutes your printers can now be located where you need them. Even if they are located behind walls or around corners.

- Up to 8 printers can be used by any number of PCs.
- Prints up to 500 feet indoors.
- Works with 100% IBM compatible PCs and printers.
- Both DOS and Windows.
- Uses high performance 2.4 GHz Spread Spectrum Radio. Plugs into computer's parallel port and printer's Centronics connector. Adapter required for each PC and printer.
- No additional software or cards.

RISK FREE MONEY-BACK 30 DAY GUARANTEE

Call 1-800-492-2320 to order!

AeroComm, Inc. 13228 W 99th Lenexa, KS 66215

CIRCLE 779 ON READER SERVICE CARD

Automated Data Collection

Process Scanned or Faxed Forms

AutoData PRO™ II is a Windows 3.1 Desktop Forms Processing Solution. Forms are read and the data is exported to one of several popular file formats. 30-Day Money Back Guarantee.

A Windows 3.1 DLL is Available for Developers

AUTO DATA

AutoData Systems
6111 Blue Circle Drive • Minnetonka, MN 55343
Phone 612/938-4710 • FAX 612/938-4693
Toll Free: 800/662-2192

CIRCLE 781 ON READER SERVICE CARD

EasyFlow

New Release VERSION 2.0

Includes
- Faster Operation
- Diagonal & Curved Lines
- Expandable Shapes
- Import Your Own Shapes
- Improved Export
- Plus Lots More!

The Easiest Flowcharter

"First and foremost, EasyFlow is simple to learn and easy to use." PC Magazine

"Even a first-time user of the program can quickly produce impressive-looking diagrams and charts." PC Magazine

"Of the three packages, EasyFlow was the most straightforward to use overall..." PC Week

The Most Advanced Charting Technology

"...excellent line, shape and text roll-up windows." PC Magazine

"EasyFlow offered the friendliest line connection options." PC Week

"The program includes comprehensive shape libraries, which conform to the charting conventions of most major accounting firms..." PC Magazine

For a FREE demo call
1-800-267-0668
(613) 544-6035

HavenTree SOFTWARE

CIRCLE 782 ON READER SERVICE CARD

Explore Your Mind and Master Your Life!

Self-Analysis Software

"Mysteries of the Mind; Your Way to the Future!" is the new Multimedia CD-ROM software for Windows based systems It contains over 270MB of computer animation, graphics and sound effects

ONLY $59.95

CALL TODAY! 408-727-3883 or FAX 408-727-3882

CIRCLE 790 ON READER SERVICE CARD

PHONEDISC '95
A QUANTUM LEAP AHEAD!

Proven to be 95% accurate!

The *ALL NEW* PhoneDisc '95!

Now, the best reason to own a CD-ROM drive – PhoneDisc '95 delivers exactly what you need to boost sales, increase productivity, expand your customer base, or maybe just find an old friend. The ultimate over achiever, PhoneDisc '95 is the **only** CD-ROM phone directory to achieve these incredible benchmarks:

- *90 million* residential and business telephone listings
- **NEW!** Unprecedented accuracy (95% on average)
- **NEW!** *ZIP+4* information for 4 out of 5 listings
- **NEW!** *Unlimited exporting and printing of all listings*
- Customized or Avery label formats with *postal barcodes for mailings*
- *Extensive coverage* of some of the most remote areas nationwide
- **EXCLUSIVE!** *Blazingly-fast* **auto-scroll** *search software*

Put your CD-ROM drive to work and move yourself a quantum leap ahead of the competition. Call us today!

COMPETITIVE UPGRADE CALL FOR PRICE!

SPECIAL MAY PRICES!

Business $79 – 9.5 million listings with reverse searching by name, address, phone number, business type or SIC code.

Residential $69 – Lists 80 million residences on 2 regional discs! Retrieves names, phone numbers, addresses and zip codes.

PowerFinder $199 – 90 million residential and business listings on 5 regional discs with reverse search indexing.

Combo Pack $99 – PhoneDisc Business and Residential directories bundled together. Two great products, one great price!

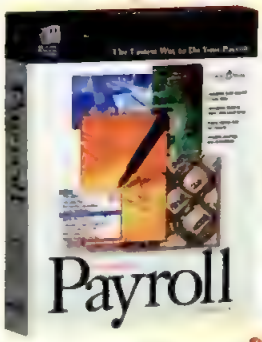
Top 100 CD-ROMs · Best Business Product · 50 Best CD-ROMs · Top 5 Business CD-ROMs · Best CD-ROM Reference Product

PhoneDisc
Digital Directory Assistance, 4931 Arlington Road, Suite 405, Bethesda, MD 20814

Call Today to Order!
1-800-284-8353

CIRCLE 783 ON READER SERVICE CARD

Payroll for Windows!



Since 1985, CheckMark Software has been providing payroll solutions for small businesses using the Macintosh. Now, CheckMark's best selling, stand-alone payroll program is available for Windows.

From entering employee hours to printing tax reports, CheckMark Payroll gives your business everything you need to get your payroll done quickly and accurately.

Exports to **Quicken**, **Peachtree**, or **M.Y.O.B.**

CHECK MARK SOFTWARE INC.

Introductory Special $69 1-800-444-9922

The Japanese Word Processor for US Windows

OLE2 compatible!

KanjiWORD Version 3.0 漢字ワード

- Windows 3.1 compatibility.
- 2 TrueType quality, scalable Japanese fonts for a clean printout at any point size.
- Insert Japanese from KanjiWORD into your other Windows applications using OLE 2.0 technology.
- User definable kanji registration allows easy lookup for unusual kanji combinations.
- 100 sample Japanese documents.
- 50,000 word English-Japanese dictionary.
- Print to any Windows-compatible printer.
- English and Japanese menus and dialog boxes, manual, and technical support.

Only $279
KanjiWORD 2.0 Upgrades $99
Free Demo Available
Call about Educational Discounts
(must qualify)

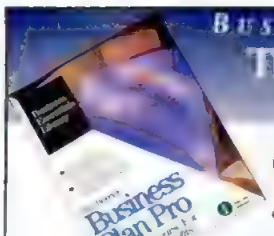
Pacific Software Publishing, Inc.
14405 SE 36th Street #300 Bellevue WA 98006
Tel (206) 562-1224 Toll Free (800)-232 3989 Fax (206)-562-0811

CIRCLE 796 ON READER SERVICE CARD

BUSINESS ESSENTIALS

The plan... get it done *right!*

Money Back Guarantee!



"Sets new standards for its genre...no other business-plan software can match it!"
—PC Magazine, *Feburary 7, 1995*

- Business Plan Pro™
- Marketing Plan Pro™
- DecisionMaker™

Call 1-800-229-7526
Fax (503) 683-6250

Palo Alto Software • 144 E. 14th Ave., Eugene, OR 97401 • pasware@aol.com

CIRCLE 784 ON READER SERVICE CARD

VIZIFLEX SEELS...
YOUR NO. 1 SOURCE FOR COMPUTER PROTECTION AND ERGONOMIC ACCESSORIES.

■ Viziflex Seels eliminates the problem of dirt, spills and other contaminates on your computer keyboard. Over 3,000 configurations available.

■ Need a customized cover? Viziflex can make 'em.

Contact us for a FREE catalog packed with many unique computer accessories. And also receive OUR SPECIAL FREE OFFER.

VIZIFLEX SEELS, INC.
16 E. Lafayette Ave. Hackensack, N.J. 07601 (201) 487-8080/Fax: (201) 487-6637

CIRCLE 777 ON READER SERVICE CARD

Video Training for Windows Applications

WATCH & LEARN IN MINUTES

Dawn Bjork
MS Certified Trainer
& MS Word Instructor

Dave Bellamy
MS Excel Specialist
& MS Excel/Project Instructor

Alison Belter
MS Certified Trainer
& Access 2.0 Instructor

Russell de Pina
Professional Trainer
& MS Visual C++ Instructor

KeyNotes — Word 6.0
Beg/Int/Adv (ea) $49.95
Desktop Publishing $49.95
Mail Merge/Forms $49.95

KeyNotes — Excel 5.0
Beginning $49.95
Intermediate $49.95
Advanced $49.95

KeyNotes — [illegible]
Beg/Int/Adv (ea)$49.95
App. Dev. 1/2/3 (ea)$79.95

Visual C++ 2.0
Level 1 $89.95
Level 2 $89.95
Level 3 $89.95

KeyNotes — Windows 3.1
Beg/Int/Adv (ea)$49.95
DOS & Win Basics $49.95

KeyNotes — Project 4.0
Level I/II/III/IV (ea) $79.95

KeyNotes — Visual Basic 3.0
Unit 1/2/3 (ea) $89.95
Unit 4/5/6 (ea) $89.95

Lotus 1-2-3 for [illegible]
Beg/Int/Adv (ea)$49.95

WordPerfect 6.1
Beg/Int/Adv (ea) $49.95
Mail Merge/Forms $49.95
Desktop Publishing $49.95

KeyNotes — [illegible] 4.0
Beg/Int/Adv (ea) $49.95

Other Videos
MS BackOffice Call
PageMaker (ea) $49.95
Harvard Graph (ea) $49.95
PowerBuilder Call
Lotus Notes Call
Presentations (ea) $49.95
Over 150 Titles Available

CorelDRAW 5
Beg/Int/Adv (ea) $49.95

Paradox 5.0
Beg/Int/Adv (ea) $49.95
Special- Any Three $129.95

Ami Pro 3.0
Beg/Int/Adv (ea) $49.95

KEYSTONE Learning Systems Corp.

KEYNOTES

30 DAY Money Back Guarantee

Microsoft Office — Special MS Office 4.x Video Combinations
MS Office 4.x Standard (9 videos, 17 hours, ...$349.95 (with KeyNotes $468.95
MS Office 4.x Pro (13 videos/24 hours) .....$495.95 (with KeyNotes $639.95
MS Office 4.x Plus 16 videos, 25 hours).....$579.95 (with KeyNotes $748.95

Novell — Special PerfectOffice 3.0 Video Combinations
Novell PerfectOffice 3.0 Standard (9 videos/17 hours).....$349.95
Novell PerfectOffice 3.0 Pro (13 videos/24 hours).....$495.95
Novell PerfectOffice 3.0 Plus (16 videos/29 hours) $579.95

Lotus SmartSuite — Special SmartSuite 3 Video Combinations
Lotus SmartSuite 3 Standard (9 videos/17 hours).....$349.95
Lotus SmartSuite 3 Pro (13 videos/24 hours $495.95
Lotus SmartSuite 3 Plus (16 videos/29 hours) $579.95

3 Easy Ways to Order
CALL ▶ 1-800-748-4838
801 375-8680
FAX ▶ 1-801-373-6872
MAIL ▶ K.L.S. Corporation
2181 Larsen Parkway
Provo, UT 84606
PCM0516
C.O.D., Company P.O. or Checks AD# PM55

Microsoft Solution Provider

DISCOVER

CIRCLE 785 ON READER SERVICE CARD

Typhoon PRINTERS by Dataproducts

Do you find your LaserJet® limiting? You need the versatility and power of our new Typhoon 8 laser printer. It features 8 page-per-minute printing, full-page 11"x17" bleeds and PostScript faxing at camera-ready 1200 dpi resolution!

Is your printer tossed about in the turbulence of a complex network? Our new Typhoon 8 with VPT™ supports 4 protocols and over 20 network operating systems. It'll handle your mixed-platform network.

So forget the 'Jet. Remember, even the biggest 'Jets stay in the hangar when a Typhoon's around. Call us to solve your printing problems.

1-800-980-0374
Ask for free print samples!

AFFORDABLE 1200 DPI PRINTING

FORGET THE 'JET...
POWER UP A 1200 DPI TYPHOON 8!

Dataproducts

©1995 Dataproducts Corp. Dataproducts is a registered trademark and VPT is a trademark of Dataproducts Corp. LaserJet is a registered trademark of Hewlett-Packard Company. Developer tested only. Novell makes no warranties with respect to this product.

CIRCLE 786 ON READER SERVICE CARD

NOVELL
NETWORK TRAINING VIDEOS

Set up, Operate and Maintain a Novell Network at Administrator Level / Ideal for C.N.E Training

AWARD WINNING VIDEOS

$169.95 (3.12 or 4.x)

it's your choice

COMBINATION 3.12 - 4.X VIDEOS $259.95

Novell NetWare 3.12 or 4.x

- LAN HARDWARE
- INSTALLING NOVELL NETWARE AND CLIENT STATIONS
- NETWORK ADMINISTRATION
- ADVANCED ADMINISTRATION
- NETWARE PRINT SERVICES
- LOGIN SCRIPTS
- 5 VHS VIDEOS
- RUN TIME 6 HOURS & 30 MINUTES
- NTSC or PAL
- 170 PAGE ILLUSTRATED WORKBOOK
- ADMINISTRATOR LEVEL/ IDEAL FOR C.N.E TRAINING

Novell's C.N.E Study Guide — Prepare for the Novell C.N.E exams

1800 pages

FREE NETWORK SUPPORT ENCYCLOPEDIA ON CD-ROM INCLUDED

Combination 5 Videos & C.N.E Study Guide with CD-ROM $235.95

LANTELL
16250 VENTURA BLVD.#202
ENCINO, CA 91436
FAX 818-905-1292

800-526-8355

CIRCLE 787 ON READER SERVICE CARD

SURVEYS • SALES ORDERS • TIME CARDS • REGISTRATIONS

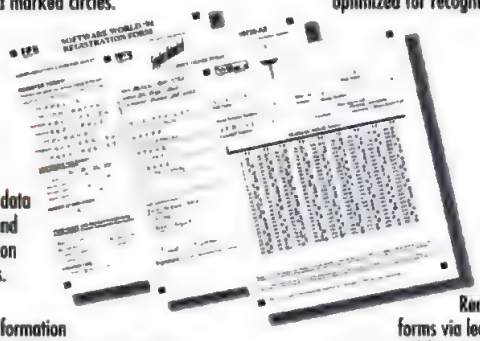
AUTOMATED DATA ENTRY

FORMS THAT FUNCTION

Only Teleform eliminates data entry, shortens turnaround time, and reduces paper handling in one integrated software solution. ***Teleform is the price-performance leader.***

Recognizes hand print, machine print and marked circles.

Creates professional forms optimized for recognition.



Includes data editing and verification functions.

Stores information in leading databases/spreadsheets.

Receives forms via leading scanners and fax modems.

TELEform VERSION 3.0 by Cardiff Software

800/659-8755

TEL. 619/259-6444 • FAX 619/259-6450 • Solana Beach, California

INSURANCE CLAIMS • PATIENT HISTORY • CREDIT APPLICATIONS

CIRCLE 789 ON READER SERVICE CARD

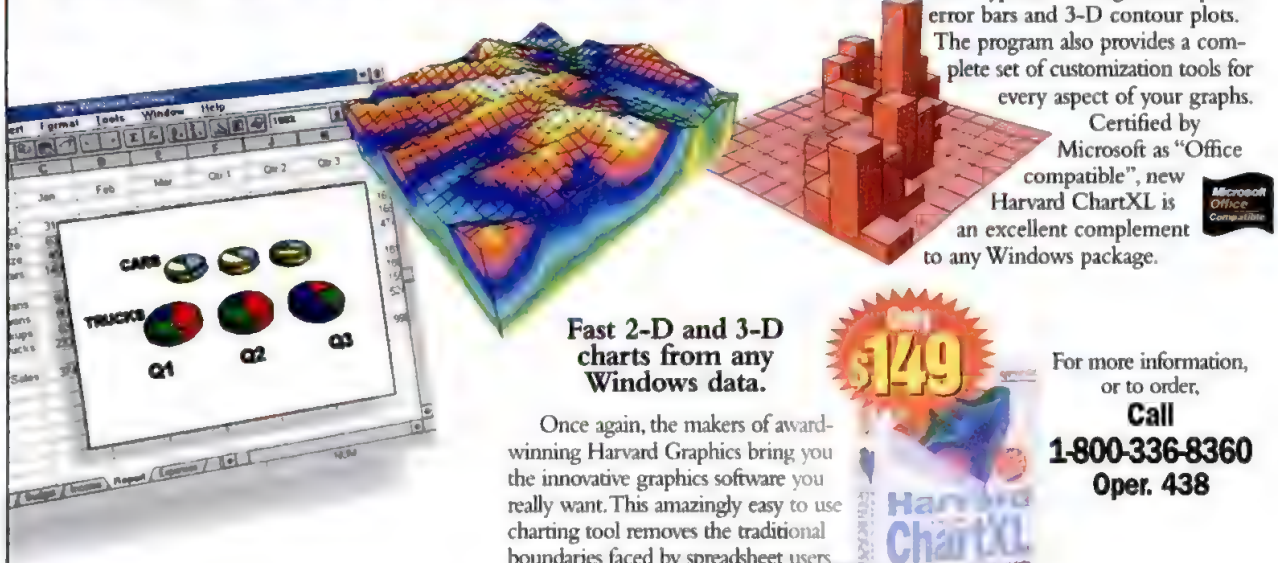
Harvard ChartXL for Windows

Visualize your Excel and 1-2-3 data like never before.

to offer fast, flexible charting and visual analysis of business, statistical and technical information.

Harvard ChartXL™ for Windows offers a dazzling Graph Gallery of 183 chart types, including bubble plots, error bars and 3-D contour plots. The program also provides a complete set of customization tools for every aspect of your graphs.

Certified by Microsoft as "Office compatible", new Harvard ChartXL is an excellent complement to any Windows package.



Fast 2-D and 3-D charts from any Windows data.

Once again, the makers of award-winning Harvard Graphics bring you the innovative graphics software you really want. This amazingly easy to use charting tool removes the traditional boundaries faced by spreadsheet users

For more information, or to order,
Call
1-800-336-8360
Oper. 438

SPC SOFTWARE PUBLISHING

© 1995 Software Publishing Corporation. All rights reserved. Harvard, Harvard Graphics and the Software Publishing Corporation name and logo are registered trademarks and Harvard ChartXL is a trademark of Software Publishing Corporation. Harvard ChartXL and Harvard Graphics are products of Software Publishing Corporation and have no connection with Harvard University. SPC acknowledges the trademarks, and the rights of trademark owners, referred herein.

CIRCLE 788 ON READER SERVICE CARD

YOUR NEXT STEREO SYSYTEM

Radio ROCKET

FM Stereo Digital Tuner

"RBDS" Smart Radio

Audio Enhancement

Radio on Demand "VCR for Radio"

800 888-5244
Sales 310 926-1928
FAX 310 926-0518

ADS Advanced Digital Systems

CIRCLE 791 ON READER SERVICE CARD

1,000's of MIDI Songs on Disks

In our new Buyer's Guide you will see:
- MIDI Songs
- Music Software for PC & Mac
- Sound Cards
- MIDI Keyboards
- Speakers
- Featuring: 'Roland Sound'

Use your computer with music for:
- Entertainment
- Education
- Business
- Presentations

For your Free Buyer's Guide, Call:
1-800-380-2580

EDIROL
"Desktop Music Presentation Products. Direct to you!"

Edirol Corp. 3rd Floor 1201-4 Ave. S. Seattle, WA 98134

CIRCLE 793 ON READER SERVICE CARD

- BIBLES
- COMMENTARIES
- DICTIONARIES
- LEXICONS
- BIOGRAPHIES
- HISTORIES
- MAPS
- DEVOTIONALS

Logos Bible Software v2.0 is a complete electronic library! More than 200 classic and modern titles are being prepared for the Logos system. CD-ROM editions from $119.95!

CALL TODAY! 1-800-87-LOGOS!

logos

PHONE: (360) 679-6575 FAX: (360) 679-8169

CIRCLE 794 ON READER SERVICE CARD

The Most Elaborate Interactive Movie Ever Created Will Blow You Away!

ACCESS SOFTWARE INCORPORATED

Killing Moon

Three Big CDs! Almost 2 gigabytes of gaming fun! (Were this put on floppies it would take almost 1250 HD disks!) ■ Stars Hollywood actors Brian Keith, Margot Kidder, Russell Means, and the voice of James Earl Jones! ■ Features a virtual reality engine that will amaze you with its realism! ■ Unparalleled graphics and freedom of movement. ■ Features a rich original musical score, high quality digitized voices and sound effects making this Interactive Movie as aurally exciting as it is visually stunning! Call 1-800-800-4880 for details.

CIRCLE 792 ON READER SERVICE CARD

Stop Monkeying Around With Other Multimedia Authoring Tools!

SoftBook® Maker™

- Complete Ready-Made Multimedia Publishing Tool
- No programming. Saves time!
- Rated the easiest authoring software. Just add your contents. Novice welcome
- Full support for your text, audio, video and pictures
- Expandable & Changeable. Expert welcome!
- Royalty Free! Commercial licensing is available for only $199.00 per title. No reporting. No quantity restrictions. Best value!
- 30-Day Money-Back Guarantee

$99.95

SoftBooks Media

SoftBooks, Inc. 22651 Lambert Street Suite 101-A Lake Forest, CA 92630

To order, have your credit card ready and call 1-800-351-3011

Other inquiries or outside U.S. call: Tel: (714) 586-1284 Fax: (714) 586-1297

CIRCLE 795 ON READER SERVICE CARD

INTER NET FREE

The world's premier Internet system is now online, offering you access to computers around the world

ALWAYS FREE

BUSINESS & RECREATION

FREE E-MAIL, USENET, IRC

CYBER LINK™

1-515-945-7000

CLASSIFIED

MEMORY
factory outlet

80387DX-33 MATH COPROCESSOR	$ 49
CYRIX CX-486DRX2-25/50 CPU UPGRADE	$189
XIRCOM PCMCIA ETHERNET COMBO	$169
ACER ACERNOTE 730/735 4M/8MB	$179/$307
ACER ACERNOTE 750/750C 4MB	$186
ACER ACERNOTE 760C/780 4/8MB	$179/$307
ACER ACROS 360S 2MB	$128
APPLE PBOOK 100 2/4/6MB	$83/$152/$198
APPLE PBOOK 140/145/145B/170 4MB	$142
APPLE DUO 210/230/250/270 4MB	$181
AST ADVANTAGE NOTEBOOK 4MB	$179
AST ADVANTAGE NB 386SX-25 4MB	$179
AST ASCENTIA 800N 4MB/8MB	$186/$349
AST ASCENTIA 900N 4MB/8MB	$186/$349
AST BRAVO NB 4MB/16MB	$192/$610
AST POWEREXEC EL/325SL 4MB	$159
AST POWEREXEC 4/25SL S/EDITION 4MB	$159
AST POWEREXEC 4/33SL 4MB	$159
AST PREMIUM EXEC 4MB	$179
CANON INNOVA 486NX 2MB/8MB	$70/$278
CANON INNOVA BOOK 10/10C 4MB	$186
CANON NOTEJET SERIES 4MB/6MB	$CALL
COMMODORE C286LT/C386SXLT 2MB	$128
COMPAQ CONCERTO 4/8/16M	$186/$340/$568
COMPAQ CONTURA/486 4MB/8MB	$186/$325
COMPAQ CONTURA 400C 4M/16M	$186/$568
COMPAQ CONTURA AERO 4MB/8MB	$186/$296
COMPAQ DESKPRO 4/8M/16M	$170/$332/$492
COMPAQ LTE ELITE 4/8M/16M	$186/$340/$568
CMPAQ PRESARIO 4M/8M/16M	$157/$311/$456
COMPUADD COMPANION/286 1MB	$ 49
DATA GENERAL WALKABOUT 425 4MB	$186
DECpc 325SL 4MB	$159
DECpc 425SE/433SE 4MB/16MB	$182/$610
DEC HINOTE 4MB/8MB/16MB	$174/$336/$568
DELL LATITUDE XP 4M/8M/16M	$174/$336/$568
EVEREX STEPNOTE 4MB/16MB	$186/$568
EVEREX TEMPO LX/CARRIER 2MB	$128
GATEWAY HANDBOOK 486 4/16MB	$174/$568
GATEWAY NOMAD 486 4MB/16MB	$186/$753
GRID 1660/1755/2260 6MB	$271
HP DESKJET 500/510/520/540/550 256K	$ 55
HP DESKJET 1200C/PS 4MB/8MB	$157/$311
HP DESIGNJET 650C 16MB/32MB	$456/$906
HP OMNIBOOK 300-425/430 2MB/4MB	$89/$240
HP OMNIBOOK 530PC/600C 4MB/6MB	$198/$365
HP OMNIBOOK 4000C 4MB/8MB	$186/$357
IBM AMBRA (all models)	$186/$360/$568
IBM APTIVA 4M/8M/16M	$157/$311/$456
IBM L40SX 4MB/8MB	$186/$330
IBM THINKPAD 300 8MB	$346
IBM THINKPAD 330/340/355/360 4MB	$174
IBM THINKPAD 350/350C 4MB/8MB	$168/$319
IBM THINKPAD 500/510 4MB/8MB	$196/$365
IBM THINKPAD 700/720/755 4/8MB	$196/$365
IBM THINKPAD 755 DIMM 4MB/16MB	$186/$568
LEXMARK 4029/4037 2MB/4MB	$70/$179
LEXMARK LEXBOOK 8MB/16MB	$375/$661
LEXMARK LEXBOOK SE 10 4M/8MB	$199/$365
LEXMARK LEXBOOK GS20/40 4/8MB	$186/$357
LEXMARK OPTRA 4M/8M/16M	$157/$311/$456
MIDWEST MICRO ELITE SOUNDBOOK	$CALL
NEC VERSA E/M/P/V 4MB/8MB	$187/$348
NEC VERSA S33/S50 4M/8M/16	$174/$336/$568
PACKARD BELL DIPLOMAT 4MB	$235
PACKARD BELL STATESMAN 4M/8M	$197/$319
PANASONIC CF-170 1MB	$ 45
PANASONIC CF-270/370 2MB	$ 90
PANASONIC CF-380/480C 4MB/6MB	$191/$271
SANYO MBC17NB 16NB 2MB	$128
SHARP 6200/6220/6240 1MB	$ 45
SHARP 6700/6781/6800/6881 2M/4M	$70/$186
SHARP 7700/7750 4MB/16MB	$182/$568
SHARP 8150/8650 4MB/16MB	$182/$568
SHARP PC-8700 4M/8M/16M	$186/$357/$568
SHARP 8900/8960 4M/8M/16MB	$186/$357/$568
TI TRAVELMATE TM2000 1MB	$ 45
TI TRAVELMATE TM4000 4MB/16MB	$186/$753
TOSHIBA T1000LE/SE/XE 2MB	$ 47
TOSHIBA T1800/T1850/T1850C 2MB	$ 47
TOSHIBA T1800/T1850 BATTERY PACK	$ 49
TOSHIBA T1900/1950/1960 4MB/8MB	$186/$365
TOSHIBA T2000/T2000SX/T2200SX 2MB	$ 47
TOSHIBA T2400/T3600CT 4MB/16MB	$174/$627
TOSHIBA T3400 4M/8M/16M	$174/$336/$568
TOSHIBA T4400-SERIES 4MB/8MB/16MB	CALL
TOSHIBA T4500 BATTERY PACK	$118
TOSHIBA T4900/T4800/4700/4600 16MB	$690
TOSHIBA T5100 2MB	$ 82
TOSHIBA T5200/T8500 2MB/8MB	$115/$374
TANDY 1500/1500HD 1MB	$ 45
TANDY 2820/3820/3830 6MB	$271
TWINHEAD SNOTE 586 8MB/32MB	$360/$1127
ZENITH Z-NOTE 425/433 4MB/8MB	$186/$350
ZENITH Z-NOTEFLEX 4MB/8MB	$174/$336
ZEOS POCKET PC 1MB/2MB	$123/$216
1MBx9-70 1MB 30-PIN NO PARITY	$ 36
1MBx8-70 1MB 30-PIN NO PARITY	$35
4MBx9-70 4MB 30-PIN WITH PARITY	$123
4MBx8-70 4MB 30-PIN NO PARITY	$119
16MBx9-70 16MB 30-PIN WITH PARITY	$588
16MBx8-70 16MB 30-PIN NO PARITY	$503
1MBx36-70 4MB 72-PIN WITH PARITY	$160
1MBx32-70 4MB 72-PIN NO PARITY	$148
2MBx36-70 8MB 72-PIN WITH PARITY	$318
2MBx32-70 8MB 72-PIN NO PARITY	$298
4MBx36-70 16MB 72-PIN WITH PARITY	$479
4MBx32-70 16MB 72-PIN NO PARITY	$444

CONTROL *Memory Factory*
1155 Chess Drive, #116 Foster City, CA 94404
Phone: (415) 578-1901 Fax: (415) 578-1914
1-800-952-7867

CIRCLE 526 ON READER SERVICE CARD

NEVADA COMPUTER

Nevada's Largest Memory Warehouse!
Specials & Liquidation
We will not be undersold!

MasterCard VISA

SIMM MODULES

30 PIN SIMM MODULES

Description	150NS	80NS	70NS	60NS
256X9	$9	$12	$15	$17
4XOMEG			$118	
1MEGX3		$35	$37	$41
1MEG X 9	$34	$40	$42	$46
4XBMEG			$124	
4MEG X 9		$129	$139	$148
16 MEG X 9 (36 CHIP)			$668	

SIPP ADD $5.00

72 PIN SIMM MODULES

512X36 2MEG	$80	$94	$108
1X32		$148	
1X36 4MBG	$148	$176	$198
2X32		$280	
2X36 8MEG	$302	$308	$378
4X32		$488	
4X36 16MEG	$518	$530	$598
8X36 32MEG		$1175	$1275
16X36 64MEG		$2695	

CPU'S

intel

80486 SX/25	$78
80486 SX/33	$98
80486 DX/25	$138
80486 DX/33	$158
80486 DX/50	$298
80486 DX2/50	$188
80486 DX-2/66	$198
80486 DX4/75	$359
80486 DX4/100	$379
PENTIUM 60	$379
PENTIUM 66	$419
PENTIUM 90	$698
CPU Cooling Fan	$9

CACHE MEMORY

	12ns	15ns	20ns	25ns
8KX8		5.95	5.75	5.45
32X8	13.00	8.00	7.75	6.75
64x1		10.95	7.85	6.95
64x4		10.00	7.95	6.95
16x4		6.95	6.45	5.95
128x8		54.00	34.00	27.00

CPU DOUBLERS

Cyrix

Single Chip Upgrade Clock Doubling Technology. Compatible with 386DX CPU Socket DOS, Windows & OS2 Compatible. Uses Industry Standard Math Chip. Easy To Install - About 15 Minutes

Cx486DRx2-16/32	$238
Cx486DRx2-25/50	$288
Cx486DRx2-33/66	$334
Cx486SRx2-25/50	$250
486DLC40	$118
486DLC33	$99

Call Toll Free
800-982-2927
For U.S. and Canadian Orders only

HOURS: M-F 7AM-5PM / SAT 10AM-2PM PST

TECHNICAL & CUSTOMER SERVICE CALL:
(702) 384-0284
PURCHASE ORDERS & INTERNATIONAL ORDERS
FAX TO: (702) 384-1168

Toshiba Memory

MODEL	MEMORY	PARTS	PRICE
T1000 SE/LE/XE	1MB	PA8311U	$29
T1000 SE/LE/XE	2MB	PA8312U	$73
T2000 / T2000SX	2MB	PA8317U	$73
T2000SX/T1000 LE	4MB	PA8314U	$108
	8MB	PA8315U	$358
T1200 XE	2MB	PA8306U	$98
T1600	2MB	PA8302U	$98
T2000 SXE/T2000SX/T1800 T1850, C			
	2MB	PA3008U	$78
	4MB	PA2001U	$198
	8MB	PA3002U	$358
T2400, T2450, T3400 3.3V	4MB	PA3019U	$218
	8MB	PA3020U	$398
	16MB	PA2023U	$798
T3100	2MB	PA7135E	$138
T3100 E	2MB	PA8341U	$108
T3100 SX	2MB	PA8308U	$108
	4MB	PA8310U	$188
T3200 SX	2MB	PA8307U	$118
	4MB	PA8309U	$198
T3200 SXC	2MB	PA8318U	$108
	4MB	PA8319U	$198
T3200	3MB	PA7137U	$184
T3300SL	2MB	PA2006U	$118
	4MB	PA2007U	$238
	6MB	PA2008U	$258
	16MB	PA2009U	$698
T3400CT	4MB	PA2019V	$218
	8MB	PA2020V	$398
	16MB	PA2021V	$758
T4400 SX, SXC, T6400 SXC, DXC			
	2MB	PA2003U	$125
	4MB	PA2004U	$198
	8MB	PA2005U	$358
	16MB	PA2010U	$698
	32MB		$1540
T4500, T4600, T1900C (3.3VOLTS) T4700	4MB	PA2012U	$198
	8MB	PA2013U	$388
	16MB	PA2014U	$858
T5100	2MB	PA8301U	$94
T5200/T5200C/T8500/T5400	2MB	PA8304U	$109
	8MB	PA8313U	$418

*FREE TOSHIBA MODEM W/ TOSHIBA MEMORY PURCHASE!

IBM Laptop Memory

Thinkpad 300, Ambra Trinia	2MB	33G9288	$128
	8MB	33G9289	$368
Thinkpad 300, 300C, 360, PSNOTE			
	8MB	6060378	$220
	16MB	6060379	$447
Thinkpad 500, 510CS, 360	4MB	81F9098	$198
	8MB	81F9099	$398
	16MB		$840
CL575X	4MB	07G1420	$208
Thinkpad 700, 700C, 720, 720C, 750C			
	8MB	07G1421	$378
	16MB	46G8109	$898
Thinkpad 700T	4MB	N/A	$198
	8MB	N/A	$368
PS/Note N48SL	2MB	92F8884	$188
PS/2, N51, 53C, SX	2MB	07G1826	$98
	4MB	07G1827	$188
	8MB	07G1828	$418
Laptop N33SX, L40SX & PSNOTE 102			
	2MB	79F0999	$98
	4MB	79F1000	$184
L40SX, PSNOTE 102 ONLY	8MB	79F1001	$358

TERMS: SHIPPING: UPS (Min. $9.25) Shipping charges are non refundable. Purchase orders from Universities, Fortune 2000 & Government Agencies, NET 30 on approval. COD add $5.00 (Cashiers check) CONDITIONS: 30% Restocking Fee on refunds within 30 days. No refunds or exchanges after 30 days - WARRANTY REPLACEMENT ONLY. ALL PRICES FINAL. PRICES SUBJECT TO CHANGE. Pfls. per 8% for convenience only. Trademarks are registered with their respective Co.'s. 486, 386, 387, 287, SX, are trademarks of Intel Corp.

PCM595

SERVING YOU FOR 9YEARS

NEVADA COMPUTER
484 Wells Road
Boulder City, NV 89005

IBM Memory

MODEL	MEMORY	PARTS	PRICE
AMBRA Enterprise 386, Hurdla 386, Sprinta 386			
	2MB	N/A	$93
	8MB	N/A	$328
AMBRA Enterprise 486, Hurdla 486, Sprinta 486			
	4MB	N/A	$190
	16MB	N/A	$640
PS/1 and 386/SX (2121)	2MB	92F9935	$88
	4MB	92F9694	$190
PS/2 30/286/25/286;			
Adpt Brd 1497259	512K	30F5348	$35
	2MB	30F5360	$98
PS/2 55SX, LS, 40SX,70-E61; 061; 121, Adpt Brd 6450609; 34F3011; 34F3077, 502, 55SX, 65SSX, P70, 55LS, 65LS X Station120 & 130	1MB	6450603	$39
	2MB	6450604	$84
PS2 50, 50Z, 55SX, 60, 65SX	2-8MB	1497259	$198
	2-16MB	6450609	$368
PS/1 Consultant, Essentials & Expert models x43, x44 & PS/Valuepoint all models except Cxx series			
	4MB	96F9290	$198
	16MB	96F9291	$598
PS/2 70-A21; A61; B21; B61; PS/1 Consultant, Essential & Expert models x11, x13 & x14, PS/Valupoint Cxx series			
	1MB	6450603	$39
	2MB	6450608	$89
PS/2 55SX; LS, 40SX, 55SX; LS, 65SX,			
	4MB	34F2933	$198
PS/2 90 XP, 95 XP, P75 (Pairs), 56 57 (all) 76, 77,			
PS/1 Pro 2123	2MB	6450902	$88
PS2 90, 95 XP, P75 (Pairs) 56, 57, (all) PS/1 Consultant, Essential, Expert x11, x13 & x14, PS/1 Pro 2123, RS/			
6000	4MB	6450128	$198
	8MB	6450130	$338
PS2/2 35SX; LS; 40SX	8MB	6450129	$338
PS2 70's and 80's	2-8MB	6450605	$297
32 BIT BOARDS	2-16MB	34F3077	$225
32 BIT BOARDS	4-16MB	34F3011	$318
PS/2 80-A21; A31; A61	4MB	6451060	$188
PS/2 80-041	1MB	6450375	$78
PS/2 80-111; 311; 121; 321; 081; 161			
	2MB	6450379	$94

4010 RISC/6000(16MB) $768, 4033(32MB) $1598, 4036(64MB) $3298

Laser Printer Memory

MODULE	1MB	2MB	3MB	4MB	5MB	6MB
Canon LBP4, 4 Lite & 4+	$118	$164				
Canon LBP-430	$128		$228			
Epson Action Laser II, 8000	$88		$198		$268	
Epson + 6000 and many more	$128		$198			
Epson Action Laser 1000 & 1500	$98		$188		$399	
Fujitsu 7100 & 7200	$199	$279				
HP Deskjet 500, 500C, 510, 550C and 560	$38 (256K)					
HP 2, 2D	$98		$164			
HP 3, 3D, 3P, 2P, 2P+	$98		$168			
HP Laser Jet 4, 3Si, XL300, 1200C		$84		$168		$318
IBM Laser 4019, 4019E (3.5MB)	$114		$164			
IBM Laser 4029	$95		$155			
NEC 90, 290	$104					
NEC 95	$88					
OKI 400848	$88					
Packard Bell PB9500	$125		$208			
Panasonic 4410/4430	$118		$174			
Panasonic 4420/4450	$118		$178			
Panasonic 4450	$98					
Panasonic 4400/5400	$129		$198			
QMS 410	$119	$159		$249		
Toshiba Page Laser 6	$99		$168			
TI XL/PS17/PS35	$44	$98				

CIRCLE 551 ON READER SERVICE CARD

IDE Hard Drive 540 MB...$299 | **IDE Hard Drive 420 MB...$199** | **IDE Hard Drive 1 GB ...$475** | **Floppy Drive 1.44 MB...$34**

HARD DRIVE SALE

MFM Hard Drives

ST 225 - 20MB MFM - 5.25 HH	$45
ST 125 - 20MB MFM - 3.5 HH	$75
ST 251- 1-40MB MFM - 5.25 HH	$90
ST4096 - 80MB MFM - 5.25 FH	$129
HH1090 - 90MB MFM - 3.5 HH	$149
MS6085 - 80MB MFM - 5.25 HH	$110
XT2190 - 170MB MFM - 5.25 FH	$295
XT1085 - 71MB MFM - 5.25 FH	$295

ESDI Hard Drives

HH2120 - 128MB ESDI - 3.5 HH	$129
HH5070 - 77MB ESDI - 3.5 HH	$125
MCP1558 - 338MB ESDI - 5.25 HH	$450
ST4766E - 666MB ESDI - 5.25 HH	$495
M2263E - 600MB ESDI - 5.25 HH	$450

RLL Drives

ST238R - 32MB RLL - 5.25 HH	$65
ST4144R - 122MB RLL - 5.25 HH	$145

IDE Hard Drives

WD93044 - 40MB IDE - 39 MS	$65
CP3000 - 40MB IDE - 28 MS	$69
ST157A - 40MB IDE - 28 MS	$75
ST351A/X - 40MB IDE - 28 MS	$79
CP30064H - 60MB IDE - 19 MS	$85
CP30174E - 170MB IDE - 17 MS	$110
CFA540A - 540MB IDE - 14 MS	$220
CFS420A - 420MB IDE - 13 MS	$185
754CAV - 540MB IDE - 14 MS	$225
420AT - 420MB IDE - 13 MS	$165
CFA850A - 850MB IDE - 12 MS	$295
2210A - 1.0 GB IDE - 10 MS	$475

SCSI Hard Drives

MIC4310 - 1.0GB SCSI - 8.5 MS	$575
1595 - 1.2GB SCSI - 5.25 FH	$575
ST4702N - 70MB SCSI - 5.25 FH	$495
ST138N-138MB SCSI - 3.5 HH	$45
ST1162N -138MB SCSI - 3.5 HH	$130
ST157N - 49MB SCSI - 3.5 HH	$75

COLOR NOTEBOOK
486DX50 4 MB RAM 210 MB HD
FAX/DATAMODEM DUAL SCAN $1795

• WE BUY OBSOLETE PRODUCTS • working /non-working Hard Drives and Floppy Drives, and old CPU & Memory!

Prices subject to change. Some items limited to supply on hand

MOTHER BOARDS

486DX2/66 with CPU	$275
386DX40 with CPU	$95
PENTIUM 66 with CPU	$495
PENTIUM 90 with CPU	$895
486 DX4/100 with CPU	Call

Mastercard and Visa accepted!

Open 7 AM - 7 PM Pacific Standard Time

MONTHLY SPECIAL!
SVGA Monitor .28 Pitch
New $195 | Demo $165

SUPER DEAL!
ST 225 w/Controller/Cable $75
ST 251-1 42MB MFM $90
CDC 94155-86 80MB MFM $99

CONTROLLERS!

MFM 8 Bit	$29
16 Bit	$39
IDE/Super I/O w/Cables	$19
ESDI	$75
SCSI	$99

SPECIAL OFFER!
386 SX/20 NOTEBOOK
2MB RAM, 1 44 MB FDD, 62 MB HD, 1S, 1P MOUSE PORT SVGA PORT $495

Sales Hotline:
(800) 774-7014
FAX (714) 832-1962

FLOPPY DRIVES

	SALE	REPAIR
1.2 MB/1.44 (refurb.)	$29	$15
360K/720K	$20	$10
PS/21 44MB	$59	$25
PS/2 720K	$40	$20

BARE-BONE 486DX2/66
4 MB RAM, 1 44 MB FDD, IDE/SIO, VLB, 101 Keyboard Minitower Case $575

BARE-BONE 386SX/25
Desktop Case W/PS, Built In IDE/FDD & VGA Controllers $99

BARE-BONE 386SX/16
Desktop Case W/PS FDD/HDD Built In Controller $89

MEMORY—Call Now for Low - Low

ACCESSORIES

IDE I/O	$19	14 4 INT MODEM	$59
Motherboard	$95	CD ROM 2X	$125
VGA Card 1 MB	$65	Mouse	$9
IDE VLB	$31	18 CD Titles	$50
Keyboard	$15	Soundblaster	$85
Dimond ST 2MB	$195	250 MB Tape Dr	$155

ACS
Sales • Upgrade • Service
Int'l. orders: 714-832-1786

CIRCLE 552 ON READER SERVICE CARD

A Dawning Age For Your Computer Needs!

COMPU.D
International, Inc.
6741 Van Nuys Blvd., Van Nuys, CA 91405
1-800-929-9333
Sales (818)787-3282
Dealer Hotline (818)780-9457
FAX ORDERS (818)787-5555 *Call for Product Fax List*

TOSHIBA

Authorized Reseller & Service Center
WE STOCK ALL TOSHIBA PARTS & ACCESSORIES

DYNAPAD T200/80W	$1499
T-1910 M.200 B Stock	$1029
T-1910CS M.200 B Stock	$1399
T-1960CS M.200 B Stock	$1699
T-1960CT M.320 B Stock	$1999
T-2100CT M.350	$2999
T-2400CS M.250/320	$1995/2195

B Stock = TOSHIBA Factory Refurbished With One Year Warranty

All Notebooks
Hard Drives & Accessories

PCMCIA 28.8/14.4 F/M	$259/139
PCMCIA Combo 10BT/10B2	$159
PCMCIA SCSI II	$169
PCMCIA Combo Sound	$399
PCMCIA Token Ring	$249
PCMCIA 10B2/10BT	$149/139
DeskStation II/IV	$279/559
Port Replicator F/2400/3400/3600	$229
Memory 4/8MB	189/379
Memory 16/32MB	$679/1450
120/250/340MB HD 2.5"	$99/199/260
540/720/810MB HD 2.5"	370/469/599

WE STOCK IBM, COMPAQ Desktop Systems

TOSHIBA

T-2400CT M.250/320	$2299/2499
T-2450CT M.320/500	$3599/3899
T-3400CT M.250 B Stock	$1549
T-4600C M.200/320	$2099/2299
T-4800CT M.510	$3599
T-4850CT M.510/772	$3950/4199
T-4900CT M.810	$5299

Call For All TOSHIBA PARTS Not Listed.

IBM ThinkPads

TP 355C 4-170/250	$1795/1895
TP 720 4-120 486SLC50	$995
TP 755C DX2/75 4-520	$4395
5250 Emulation PCMCIA	$425

Full IBM PS/2 Parts List Available
2MB Memory f/50/50Z/60/70/80 $75
System Board f/50/50Z/55SX/60 $95
IBM Portable Printer, 2.5 Lbs., 360X360dpi $139

APPLE

PowerBooks

6100/7100	CALL

PowerMacs

6100/7100	CALL

COMPAQ

Prolinea 4/25SX M.120	$645
Deskpro 4/66i M.4/240	$1090
Contura Aero 4/25 M.84/170	$650/750
Contura 400C/400CX/410	CALL
LTE Elite 4/75CX M.540	$4095
LTE Elite 4/40CX M.340	$2550
LTE Elite Expansion Chassis	$555

UMAX® Scanners

630 OA1 $279
- Flatbed
- 600X300dpi
- 1200dpi Max. Res.
- 16-Bit GrayScale
- 110/220Volt

630LE $475
- Flatbed
- 600X300dpi
- 1200dpi
- 24-Bit Color
- 110/220Volt

■ Transparency Adapter ----------$425
■ Automatic Doc. Feeder ---------- $385

VISTA S6 $589
- Flatbed
- 600dpi up 4800dpi
- One-Pass Color
- 24-Bit Color
- 110/220Volt

■ Vista T630 600x300dpi up to 4800Color ---$499

840 $549
- Flatbed
- 800X400dpi
- 1600dpi Max. Res.
- 24-Bit Color
- 110/220Volt

■ Vista S8 800x400dpi up to 6400Color ---$749

1260 $769
- Flatbed
- 1200X 600dpi
- 2400dpi
- 24-Bit Color
- 110/220Volt

1200SE $1299
- Flatbed
- 1200X 1200dpi
- 4800dpi Max. Res.
- 30-Bit Color
- 110/220Volt

■ Photoshop LE & OmniPage OC R ---$99
■ Photoshop & Kai'sPower Tools ----$210

UMAX®
PowerLook with Transparency Adapter $2575
1200dpi Optical up to 9600dpi • One-Pass Color • 30-Bit Color • 110/220Volt
UMAX®

We Honor AmEx., Discover, MC, &Visa.
Prices Reflect Cash Orders & Are Subject To Change.

The Lowest Price Guaranteed

FOR Leasing Options
Please Call (818) 787 1054

CIRCLE 628 ON READER SERVICE CARD

YOUR BEST SOURCE FOR NOTEBOOKS & DESKTOPS 1-800-446-3003

486 SLC SUBNOTEBOOK $ 599.99
- Made by IBM
- Fax/Modem (9600/2400)
- 80Mb Hard Drive (40 MB HD-Double Spaced to 80 MB)
- Pen Pointing Device cordless battery operated
- 4MB-25 Mhz-6" Backlit VGA LCD Serial, Parallel, Keyboard, & SVGA Video Ports DOS 5, Windows 3.1 (for Pen). 9"x5. 5"x1.25". Nickel Metal Hydride Battery, 4 lbs. w/ Battery, Keyboard and Case

TEXAS INSTRUMENTS NOTEBOOK $ 1799.99
- TI 4000E
- TFT Active Color
- 486DX2 / 50 MHZ
- 4 MB RAM - Expendable
- 200Mb Hard Drive
- 1.44 Internal Floppy Drive
- Trackball VGA Port
- Serial / Parallel, PS2 Port
- DOS, Windows
- Car adapter & Battery Charger 110/220V

TOSHIBA
- T 180 CS / 200 ..... $ CALL
- T 1960 CT / 200 ..... $ CALL
- T 2400 CS / 320 ..... $ CALL
- T 2400 CT / 250 ..... $ CALL
- T 3600 CT / 250 ..... $ CALL
- T 4800 / 120 ..... $ CALL

CALL FOR OTHER MODELS BEST PRICE!

DESKTOP

IBM AMBRA BLUE LIGHTNING
- Desktop and Mini -Tower
- 486 DLX 66 Mhz
- 452MB HD, 4MB RAM, 1MB Video
- 256K Cache, 1.44 FDD
- 2x CD-ROM Drive
- 16 Bit Sound Card Mouse, Speakers, Keyboard
- Many CD Software Titles

$ 999

IBM 486SX 33MHZ PS/1 ISA
- 4MB RAM 170MB HD, Dual FDD Fax/Modem
- Keyboard, Mouse, SVGA CARD, 3 ISA SLOT
- DOS, Windows, MS Works

$ 699

IBM LEXMARK
- 386SXL 25 Mhz Notebook
- 4 Mb RAM, 80 Mb Hard Drive
- Fax/Modem, trackball,
- DOS, Windows, 1.44 FDD
- VGA Port, Serial/Parallel

$ 699.99

TEXAS INSTRUMENTS COLOR NOTEBOOK
- 486 SX 25 Mhz
- 120MB HDD, 4MB RAM
- STN Color Display, 3.5" fdd, Clip-on Trackball,
- 5.9 Lbs
- DOS 6.2, Windows 3.1, Serial / Parallel
- VGA, PS/2 Port

$ 1199.99

24 PIN PRINTERS
- 360 DPI 240 CPS
- Epson/IBM Emulation, Parallel Interface
- Wide Carriage $159

$ 149

IBM 486 DX2/50:
- 4MB, 250 Modem ..... $ 899

Pentium P90:
- 8MB, 420 HD ..... $ 1399

Pentium P90:
- 8MB, 540 HD ..... $ 1899

EPSON 486 DX33 NOTEBOOK
- DOS, Windows, 4 Mb, 200 HD, Fax/Modem, Track Ball, PCMCIA

$ 999

386 COLOR NOTEBOOK
- 4 Mb, 120 HD, Modem

$ 899

GATEWAY 286
- 40MB, 4MB
- Fax/Modem

$ 399

BEST PRICES ON MEMORY FOR NOTEBOOKS
IBM, AST, NEC, TOSHIBA, EPSON, COMPAQ

MICROSEL, Inc.
Call Order Only: 800-446-3003
Sales: 909/734-8767 Fax: 909/734-8683
Some products may be in 11 stock
Price subject to change without notice

CIRCLE 553 ON READER SERVICE CARD

BATTERIES

$5 OFF **POWER**
- Increase Your Battery Life!
- Over 3,000 Laptop Batteries
- Cellular and Camcorder too
- Same day Shipping & 1 yr Guarantee
- NiCad and Nickel Metal Hydride

IBM Thinkpad 360/750 Series	$219
Compaq Contura NiMH	$119
NEC Versa NiMH	$179
Texas Inst TM3000/4000	$82
Toshiba T1000LE/SE/XE	$59
Toshiba T1900-1960 NiMH	$125
Toshiba T4700-4900CT	$125
AST Premium Executive	$74
Universal Laptop Car Cord	$69

800-769-3739
Open 24 hrs/7 days Key: FF121
Call for FREE Battery Guide & Catalog

CIRCLE 557 ON READER SERVICE CARD

The HARD DRIVE WAREHOUSE
30 day money back guarantee

425MB	HP 2235S	SCSI	$185
425MB	Conner 420	IDE	$175
540MB	Quantum 540S	SCSI	$229
540MB	Seagate 2660A	IDE	$199
730MB	Quantum 730S	SCSI	$275
850MB	Conner 850A	IDE	$269
1.0GB	Seagate 31220A	IDE	$375
1.0GB	Seagate 31230N	SCSI	$525
1.0GB	WD 31000	IDE	$385
1.2GB	Conner 1275A	IDE	$395
1.7GB	Micropolis 2217A	IDE	$599
2.0GB	HP 3325A	SCSI	$849
2.0GB	Conner 2105S	SCSI	$799
2.0GB	Micropolis 4221	SCSI	$899
2.0GB	Seagate 32550N	SCSI	$939
2.0GB	Quantum 32150	SCSI	$949
3.0GB	DEC 5300S	SCSI	$799
4.0GB	Conner 4207	SCSI	$1350
4.0GB	Micropolis 3243	SCSI	$1350
4.0GB	Seagate 15150N	SCSI	$1450
9.0GB	Micropolis 1991	SCSI	$2699
9.0GB	Seagate 410800	SCSI	$2799

3.0GB SCSI Micropolis 1936 $799
Yes! They are all brand new drives!
- 5-year original factory warranty
- No surcharge for credit cards
- Prices are subject to change without notice

BASON COMPUTER INC Call: (818)727-9064 • Fax: (818)727-9084 1-800-236-4463 21550 Nordhoff St. #A Chatsworth CA 91311

– Please add $29 for external drives –

CIRCLE 554 ON READER SERVICE CARD

WE'LL PAY *YOU* FOR YOUR OLD MEMORY

1x9, 4x9, 30 Pin, 72 Pin, Ind. Chips, Mem. Bds., IC Dram Cards

— *ANY MEMORY* —
All Memory Has Value!

Don't let your old memory collect dust
Call or fax what you have available
1-800-718-7755
THE MEMORY LIQUIDATORS
"The company that buys memory back"
531 Main St., Ste.1174, El Segundo, CA 90245-3060
Ph. 310-676-3074 Fax 310-676-3076

CIRCLE 558 ON READER SERVICE CARD

AmPam LOW WAREHOUSE PRICES!

		70ns	80ns	60ns
TYPE				
256K x 4	DIP	$5.83	$5.96	$5.99
1M x 1	ZIP	$6.00	$6.50	$6.99
256K x 9	SIMM	$10.99	$12.99	$14.99

HIGH-QUALITY PRE-TESTED SIMM'S

		80ns	70ns	60ns
1M x 9 3 chip	SIMM	$40.00	$39.00	$41.00
1M x 9 9 chip	SIMM	$41.00	$42.00	$42.50
4M x 9 9 chip	SIMM	$142.00	$139.00	$144.00
1M x 36 72pin	SIMM		$163.00	
4M x 36 72pin	SIMM		$586.00	

NOW AVAILABLE! HARD DRIVES

ST 3391A	340MB	13ms	IDE	$79
ST-3491A	426MB	14ms	IDE	$185
CFS-540A	540MB	13ms	IDE	$214
CFA-1257A	1.26GB	12ms	IDE	$450

OTHER MODELS IN STOCK!

NEW! CD-ROM DRIVES

CD Internal	250ms	IDE	$35
TEAC 4x Internal	195ms	ISA	$199
NEC 4Xe External	220ms	SCSI	$499

1-408-975-2440
FAX 1-408-975-2446
3089 Camden Ave #339, San Jose, CA 95134
All merchandise 100% guaranteed. We accept VISA, MC, Discover. COD and company PO's with prior approval. Prices, delivery and terms however subject to change. Minimum order $100. Returns require RMA, non-defective returns subject to a 15% restocking fee.

THE FINEST MOTHERBOARDS!!!

HSB Computer Laboratories, since 1986 one of the industry's most respected circuit board manufacturers, offers TRUE factory-direct wholesale pricing and unmatched technical support. Just a few product samples include:

- HSB 80486/P24T VL BUS MB W/256KCC & 80486DX2 66MHz CPU — CALL
- HSB Pentium PCI MB W/256KCC & Intel P54C 100MHz CPU — CALL
- HSB S3 Vision 864 PCI Video Card W/2Megs 64 Bit — CALL

Please call for a free wholesale product guide & catalog. All HSB circuit boards feature a 60-DAY money-back guarantee, and a full 3 or 5 YEAR warranty. All CPU's are warranteed for life. We positively guarantee our circuit boards to be the fastest available. Major credit cards & CODs accepted.

HSB COMPUTER LABORATORIES
24208 Aurora Road #237, Cleveland OH 44139
TEL: 1-800-407-0401 FAX: 216-498-1374

CIRCLE 555 ON READER SERVICE CARD

PC -in-a- Box

$499 ~~$599~~

Portable OEM system with core functions of a PC. DOS applications run from ROM with no change. Complete development support is provided. Uses KS-9 F8680 CPU card with 256K SRAM, DOS, PCMCIA, LCD, keypad, tsrl, 4hr batt. $599 q1

KILA
Boulder, Colorado 80301 USA
Tel 303.444.7737
Fax 303.786.9983

CIRCLE 564 ON READER SERVICE CARD

CREATIVE COMPUTER CONCEPTS inc.

COMPLETE 486 DX2-66 MH MULTIMEDIA SYSTEM 428 MEG HD, 3.5, 5.25, SVGA .28 MONITOR 2X CD ROM SOUND CARD, SPEAKERS MIC, JOYSTICK, MOUSE KEYBOARD DOS 6.22 WINDOWS, MANUALS 1 YR WARRANTY, GET IT ALL FOR $60.00 PER MONTH!! WE WILL CUSTOM BUILD ANY SYSTEM FOR YOU AND SHIP THE NEXT DAY. THE ONE TO CALL FOR ALL YOUR HARDWARE NEEDS. FINANCING AND LEASING AVAILABLE. VISA MC ACCEPTED CALL NOW
1-800-222-8943

CIRCLE 563 ON READER SERVICE CARD

CPU, Memory & Motherboard
Ready to Ship at low, low price !!

800-448-2031
Mon-Fri: 9-7 Sat:10-5

CPU		Memory	
486DX/33 (Intel)	$90	1Mx3-70 SIMM	$39
486DX2/66 (Intel	$185	4Mx9-70 SIMM	$149
486DX4/100 (Intel)	$325	1Mx32 SIMM (4MB)	$156
Pentium/60 (Intel)	$380	2Mx32 SIMM (8MB)	$306
Pentium 66 (Intel)	$420	4Mx32 SIMM (16MB)	$446
Pentium/90 (Intel)	$645	1Mx36 SIMM (4MB)	$167
486DX2/66 (AMD)	$163	2Mx36 SIMM (8MB)	$331
486DX4/100 (AMD)	$238	4Mx36 SIMM (16MB)	$512

One Year Parts & Labor Warranty
30 Day Money Back
Major Credit Cards, PO & COD accepted
(10 days warranty for CPU only)

Motherboard (No CPU)

486SX/33 ISA MB (with CPU)	$89	Cooling Fan for 486	$7
486DX-DX4 VLB w/256K Green MB	$87	Cooling Fan for Pentium	$13
Pnetium/60-66 PCI w/256K MB	$205		
Pentium/90 PCI w/25 w/256K MB	$240		
Pentium/90 PCI/VLB w/256K MB	$250		

(** Prices subject to change without notice)

Best Price & High Quality Components for System Upgrade

Mini Tower Case/200W:	$30	16-bit ISA SVGA 1M:	$53*
Mid Tower Case/230W:	$48	32-bit VLB SVGA 1M:	$67
Full Tower Case/250W:	$75	101Enhanced Keyboard:	$19
3.5" 1.44MB Floppy:	$35	14.4K Internal Fax Modem:	$52
5.25" 1.2MB Floppy:	$47	3 Buttom Serial Mouse:	$9
420MB IDE Hard Drive:	$185	2 Speed CD-ROM:	$118
540MB IDE Hard Drive:	$219	4 Speed CD-ROM:	$229
730MB IDE Hard Drive:	$277	SoundCard-Speakers:	$72
850MB IDE Hard Drive:	$299	16-bit Network Card Comb:	$29
1.06GB IDE Hard Drive:	$439	Adult CDs (Movie & Picture)	$10
ISA IDE/IO Card :	$11	Full Sreen Movie Available (M-Peg CD)	$249
VLB IDE/IO Card :	$19		

FLASH Technology Inc.
55 W Hoover Ave, #9 MESA, AZ 85210
Tel(602)464-9272 Fax(602)464-9856
800-448-2031

CIRCLE 560 ON READER SERVICE CARD

800-436-0552 NOTEBOOKS

Toshiba $499 NOTEBOOK

T1910/200	$1149
T1950/120	$1299
T1950/200	$1499
T1950CT/200	$2099
T1950CT/320	$2249
T1960CS/320	$2199
T1960CT/200	$2299
T2100/2150	$CALL
T2400CS/320	$2349
T2400CT/250	$2699
T3400CT/120	$1699
T3600CT/250	$2999
T4700/CS/CT	$CALL
T4800CT	$3799
T4900CT	$5899

IBM 486 Built by $699

4MB
80MB
- 6" Display
- Weighs 3.5 lbs.
- FaxModem - *FREE*
- Pen Pointing Device - *FREE*
- Leather Case - *FREE*
- Double Spaced HDD

Extra Battery $14.99
Ext. 3.5", 1.44 FDD

386 Notebook NEC W/ FAX Modem $599

- 20 MHz
- 4/60MB
- Floppy
- Trackball
- DOS

w/ CD ROM - **$699**

IBM Thinkpad 500 $799 Lease $45/mo.

- 486 SLC/50
- Mono VGA
- 4MB
- PCMCIA
- 80MB

120MB - $Call

GRID Laptop $349

486SX Color Notebook $1199 Lease $59/mo.

- 33 MHz
- 4 MB
- 2 PCMCIA
- 120 MB
- 1.44 FDD
- Fax Modem

Leather Cases $39 Carries Notebook and Printer

Written authorization required on all credit cards for verification

Dollar Computer Corporation
Fax Orders: 714-975-1560
Cust. Service: 714-975-0873
Inquiries: 714-975-0552
1809 E. Dyer Road, #304, Santa Ana, CA 92705

CIRCLE 559 ON READER SERVICE CARD

RETAIL STORE POINT OF SALE

Need Inventory Control??
For all retail stores. Has quick invoicing, on line stock search and browse, sales analysis, stock order listings, and inventory updating
$289 - $489

Cash drawers, tape receipt printers, barcode scanners Accts Receivables, Mailing List program, Barcode programs, General Ledger, Accounts Payables

Inventory Programs for labs, supply rooms, dental offices, Hospitals, Auto Parts, Tire Dealers, and wholesalers
Free technical support

800-426-6598
Freeman Software
334 Fieldside - Garland, TX 75043

PORTABLE PRODUCTS™

YOUR COMPLETE SOURCE FOR BAR CODE AND HANDHELD DATA COLLECTION SYSTEMS

- BARCODE READERS — Keyboard wedge, RS-232, PC, Mac, Most data terminal interfaces
- INPUT DEVICES — Laser, CCD, Wand, Slot, Magstripe — All available with built-in decoder
- PORTABLE HANDHELD READERS — DOS & Windows Application Generators — No programming experience needed. Develop your Application in minutes
- Printers, Verifiers, Label Software, Labels, Custom Cases, Custom Software Development, Systems Integration. Complete Systems

FREE UNLIMITED 800 TECH SUPPORT
UNCONDITIONAL SATISFACTION GUARANTEE
CALL FOR FREE CATALOG
1-800-849-0958

PORTABLE PRODUCTS™
A Division Of International Systems Group, Inc
8401 K Mayland Drive • Richmond, VA 23294
phone 804-346-0111 • fax 804-346-0196

CIRCLE 565 ON READER SERVICE CARD

BUYERS

Marketplace readers are buyers. 60% of them bought hardware from a Marketplace ad in the last 12 months.

Advertise Here, Where Brand Specifiers Buy Direct!
Call 800-825-4237 Today!

NETower

Plug & Play CD-ROMs on your NOVELL NETWORK

Sony & Toshiba 4X CD-ROM drives
Direct Ethernet, Token Ring or SCSI connections

SMS Data Products Group, Inc.
1501 Farm Credit Drive.
McLean, VA 22102
yes Runs with NetWare
1-800-331-1767

CIRCLE 561 ON READER SERVICE CARD

BAR CODE EXPERT

HP steel wand with Keyboard wedge reader **$219**

3" CCD with built-in Keyboard wedge reader **$329**

Portable data collector **$599**
- 128K RAM (expand to 256K)
- Built-in program generator
- Uploads data directly to your application software
- Can be used as a fixed reader

- Keyboard wedge reader for PC/XT/AT, PS/2 MAC, Terminals. No software change
- Reader with RS-232, RS-485, DTMF output and multidrop protocol.
- Direct from manufacturer 30 day money back guarantee. Please call for free catalog.
- Dealer and distributor's discount available.

800-765-2271
IBS-Intelligent Barcode Systems
16031 Kaplan Ave., City of Industry, CA 91744
Tel. (818)968-6265 • Fax. (818)968-5527

CD ROM TOWER AND JUKEBOX SERVERS FOR ALL OPERATING SYSTEMS

- Sony-Toshiba-NEC-Plextor double or quadruple speed drives
- Discport or Discery CD Rom networking included
- Unlimited user license
- Map CD Rom drives as if they were disk drives
- NLM's run on server but tower can be located anywhere on network
- Complete kit to network your CD Roms

JES HARDWARE SOLUTIONS
"Burner Systems"

FOR BEST PRICE
CALL (800) 482-1866

CIRCLE 552 ON READER SERVICE CARD

CLASSIFIED

Bar Coding for Windows

Code 39 Code 93 Int 2 of 5 PostNet
Code 128 Codabar MSI-Plessey UPC/EAN/ISBN

0 12345 67890 5

Postscript/TrueType Fonts
Easy-to-Use
30 Day Guarantee
$149 each + S&H

Call for FREE information
210.590.9528
fax:210.656.8993
10902 Forest Smt. San Antonio, TX 78233

riversedge™

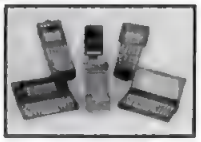
CIRCLE 567 ON READER SERVICE CARD

Dynasys®

LOWEST PRICES TOP NAME BRANDS

CALL FOR FULL TECHNICAL SUPPORT

LOWEST PRICES IN THE INDUSTRY



HAND - HELDS

	List	Sell
Hand-Helds (Psion, Percon)		
Organiser II	275	Call
Psion HC100-AL	895	Call
Series-3 256K-S	395	Call
Percon PT2000	795	Call
Label Software (Strandware, ISD)		
Label Matrix	495	$ 371.25
Power Label	995	$ 746.25
Barney Express	495	$ 366.00

3" CCD SUPER SPECIAL
CCD w WEDGE $270

BARCODE SCANNERS

	List	Sell
CCDs (Hippodrome, Opticon, Welch Allyn)		
BCS-5040	395	$ 200.00
BHS-6080	595	$ 297.50
BHS-6080	645	$ 322.50
HLT-1105	595	$ 297.50
HLT-5105	695	$ 322.50
CCD Kbd Wedge	495	$ 270.00
WA ST3400	695	$ 417.00
Lasers (PSC, Spectra-Physics, Symbol)		
PSC 5310 HP	1195	$ 699.00
PSC 5310 IP	1295	$ 759.00
SP 400	1195	$ 717.00
LS 2000	1125	$ 675.00
LS 3000	1295	$ 777.00

(All prices include standard cable)

BARCODE PRINTERS

	List	Sell
Zebra		
Stripe S-300	1395	$ 1116.00
Stripe S-500	1795	$ 1436.00
170 XI	5495	Call
Call for pricing on other Zebra products.		
Datamax		
Allegro	1495	$ 1196.00
Prodigy	2195	$ 1756.00
Prodigy Plus	2495	$ 1996.00
Codewriter		
4102	1795	Call
5106	2495	Call
DH Technologies		
DP2020	849	$ 679.20
Pinnacle	2195	Call
Citizen LP-3022-P	995	$ 796.75
Seiko S400	2495	$ 2120.75

PCMCIA BARCODE

	List	Sell
Interface Card & S/W 450		$ 369.00

Type II, Wand and Laser Decoding

COMPSEE PERCON

Wedges (Compsee, Percon)		
Connecter	280	$150.00
Quicklink	295	$193.00
Series 10 Plus	225	Call
Series 20 Plus	415	Call

OPTICON COMPSEE SPECIAL
WAND w/ WEDGE $220

Dynasys Technologies Inc. 800 Bellair Rd. • Clearwater, Florida 34616 USA

Call (813) 443-6600 Fax (813) 443-4390

Prices subject to change • Call for latest pricing • All product names mentioned herein are trademarks of their respective companies.

CIRCLE 566 ON READER SERVICE CARD

BAR CODE READERS

AMERICAN MICROSYSTEMS

2190 Regal Pkwy. • Euless, Texas 76040 • (817) 571-9015

FOR PC, XT, AT, PS/2 & TERMINALS:

- No software changes required
- Data appears as keyboard input
- Reads Code 39, I-2of5, UPC/EAN, Codabar 11, 93, 128, MSI/Plessey
- Auto-discriminates between codes
- Accepts WAND, SLOT, MAG STRIPE, CCD, LASER
- Easy To Use

MAG STRIPE

SLOT (BADGE)

WAND

LASER

CCD

METRO LASER

DECODER BOX

BAR CODE PRINTING SOFTWARE:

- For Epson, OKI, IBM, Dot Matrix and HP LaserJet Printers
- Prints Code 39, I-2of5, UPC/EAN, Codabar, 128, 93, 11, MSI/Plessey

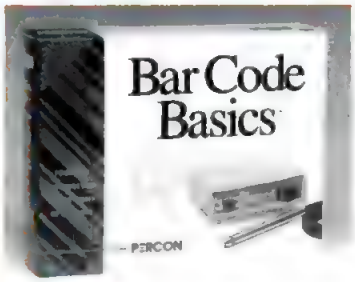
PORTABLE READERS:

- Use as a portable, wedge or terminal
- Input Devices: WAND, CCD, or 5V LASER
- Real-time clock for date and time stamps
- Automatic power off with resume
- "Built-In" inventory programs
- 54 key alpha/numeric keyboard
- Supports HAYES compatible modems

VISA

(800) 648-4452 • FAX: (817) 685-8232
30 Day Money Back Guarantee
One Year Warranty

Bar Code Solutions



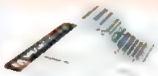
PERCON INCORPORATED

Bar Code Basics™

- Complete kit contains everything you need to create and scan bar codes.
- Works with IBM® PCs (286 or higher), PS/2s, or compatibles.
- Includes Series 10 Plus decoder, steel wand, interface cable, and StrandWare® Label Matrix™ Limited Edition bar code labeling software.
- Perfect turnkey solution for POS, accounting, and data entry applications.

For more information or your nearest reseller **1-800-743-6647**

BAR CODE LABELING, PRINTING & READERS



BEAR ROCK BAR CODE LABELER™ for Windows

- Design labels with bar codes, text & graphics.
- Choose from over 500 popular label formats, or design your own.
- Print all popular bar code symbologies.

PC World says "...*it's easy, sophisticated labeling...*"

PRINTBAR™ BAR CODE PRINTING

- PrintBar. Precision bar code fonts for Windows, OS/2 or Macintosh
- PrintBar II. Bar code printing program for DOS.

CODESCAN 3000™ BAR CODE READER

- Compatible with PC, PS/2, Macintosh or serial terminals
- Comes with wand and 5 year decoder warranty
- Laser gun, CCD, badge slot, magstripe options

Money Back Guarantee
Bundle Discounts
800-232-7625

Bear Rock TECHNOLOGIES

4140 Mother Lode Dr., Ste. 100
Shingle Springs, CA 95682

Bar Code Headquarters

Offices in USA and Europe

Labeling Software

For Dot Matrix or LaserJet — *For Windows and DOS!*

- Any Format, Any Label. WYSIWYG, Text Design
- **Formats for Sears, K-Mart, Penney's, WalMart, TCIF, Logmars, AIAG, etc.**
- UCC-128, UPC/EAN, 2 of 5, Codabar, & Code 39
- Big Text and PCX. Powerful, Versatile, Easy!
- Imports ASCII data files from dBase, etc.
- LabelRIGHT® for Windows® – **$295**
- Above Label Printed by LabelRIGHT® DOS–**$279**

Bar Code Fonts for Windows®

- Insert bar codes into any font based Windows program via "Hot Key"
- UPC/EAN, UCC-128,128, 2of5, Codabar, Code 39
- Fonts, Bitmaps and Metafiles, Complete – **$199**

Cordless RF Wands & Lasers

- Attaches as 2nd Keyboard on PC's or Macs
- Base Station to Wand – 100'
- **$200** units extend range by 100 + feet each. Multiple units cover large area
- USA and Canada Approved
- Serial or Keyboard Interface
- No License Needed
- Complete Cordless Wand System – **$695**
- Complete Cordless Laser System – **$1775**

Portable Bar Code Readers

for PC,XT,AT,PS/2,Macintosh, and Serial Interface Computers — *With Voice!*

- Battery Operated Reader — 64K or 256K
- Kybd or Serial Intf.
- Display messages & voice messages prompt operator.
- Pick lists, tables.
- Wand, CCD or Laser Scanner
- UPC/EAN, 128, 2of5, MSI, Code 39, etc.
- Date/time stamps
- Built-in Inventory Programs -No Programming Necessary
- **Very Easy to Create Custom Prompts**
- Small Size-Only 12.5 oz.- 65,000 scans/battery set
- 64K Unit Complete with Wand & Voice – **$799**
- 256K Unit Complete with Wand and Voice– **$899**

Thermal Transfer Printers

- 2"per second Thermal Transfer – Up to 4"wide
- Supports all Popular Bar Codes; 1 year Warranty
- Prints Bar Codes, Big Text, and PCX Graphics
- Complete with labels, ribbon, cable, LabelRIGHT DOS software, and Datamax Allegro Printer – **$1895**

Bar Code Readers

for PC, XT, AT, PS/2, Mac and RS-232 Terminals

- Attaches as 2nd Keyboard
- UPC/EAN, Code 128, 2of5, MSI, Code 39
- Wand, Magstripe, CCD, Slot Badge or Laser
- All European Keyboards Supported
- Superior Read Rates. Made in USA.
- **Top Rated by Independent Reviews**
- Complete Wand only Reader – **$329**
- Complete with CCD Scanner – **$624**
- Complete with Laser Scanner – **$784**

SEE US AT COMDEX ATLANTA BOOTH #233

- **Made in the USA**
- **"800" Tech Support**
- **Qualified P.O's Accepted**
- **2 Year Warranty on Readers**
- **Same Day Shipping**
- **Free UPS Blue in US**
- **30 Day Money Back Guarantee**

WORTHINGTON DATA SOLUTIONS

Call for our Free Catalog

Ordering is Easy! 800-345-4220

Europe Phone: (353) 1 6614 566 • Europe Fax: (353) 1 6614 622 USA Phone: 408-458-9338 • USA Fax: 408-458-9964

THE BAR CODE LEADER DOES IT AGAIN

KEYBOARD WEDGE SOLUTIONS!

HAND-HELD LASER WEDGE COMBO starting at... $595

HEWLETT PACKARD KEYBOARD WEDGE / WAND $239

800 TECHNICAL SUPPORT
30 DAY MONEY BACK GUARANTEE
SAME DAY SHIPPING
2 YR LASER SCANNER WARRANTY

1-800-486-0620 PHILADELPHIA
1-800-486-9585 SEATTLE
1-800-486-6229 TAMPA

DATAVISION

CIRCLE 569 ON READER SERVICE CARD

BARCODE

MAGNETIC STRIPE SYSTEMS

12140 Severn Way, Riverside, CA 92503

$249 **Hewlett Packard** Stainless Steel Wand with decoder/mag. reader/wand holder

$699 **PSC QuickScan** Laser with decoder/mag. reader/laser holder.

$849 **SYMBOL LS2000 Laser** with decoder/mag. reader/laser holder

MAGNETIC STRIPE READ/WRITE SYSTEMS for tracks 1, 2 and 3 - $1099

SOFTWARE WEDGE (DOS/WIN) with HP steel wand or laser

PRINT SOFTWARE (DOS/WIN/UNIX...)

INVENTORY, TOOL, PICK, ASSETS, RECV, TIME and ATTEND... application software

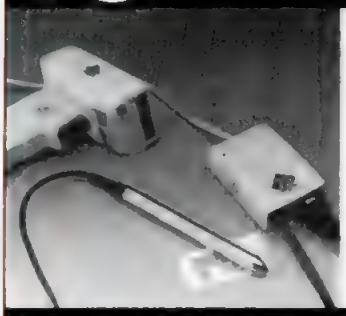
FREE Bar Code Printing Software with any purchase $149 Retail

800/653-4252 USA
800/219-5178 CANADA
909/270-0016 INTL
909/270-0920 FAX
30-Day Money Back Guarantee* 1-5 Yr Warranty • MADE IN THE USA • Same Day Shipping FREE UPS Ground

BIS

CIRCLE 568 ON READER SERVICE CARD

ITS Bar Code Solutions ITS



Wand, Laser & CCD Scanners
Magnetic Stripe Readers
Label Printers & Software
Keyboard & Serial Decoders
Portable Data Collection Terminals

30 Day Money Back Guarantee • Next Day Delivery
Call for Free Application Assistance & Full Line Catalog

International Technologies and Systems
655 N. Berry Street, Suite K, Brea, CA 92621, (800) 228-9487
9201 Forrest Hill Avenue, Suite 108, Richmond, VA 23235, (800) 826-1688
International Sales Tel: (714) 990-1880 Fax: (714) 990-2503

CIRCLE 570 ON READER SERVICE CARD

CELLULAR SOFTWARE
WE HAVE IT ALL!

• Supports over 20 popular phones
• All Motorolas over 9122
• Test Modes/ ESN Emulation
Only $149
ESN READER.....$400
G2/AMPS(no lock).....$600

We are offering a new 8.6 MB cellular package that includes book and software for the most popular phones that lets you clone several phones to one existing account. It's legal, too! Use your phone as a scanner. Software contains many utilities and peripheral programs for the astute user. Call for details.

CELLULAR MASTERS
4045 S. SAVIERS RD., OXNARD, CA 93033
(805) 486-0867

CIRCLE 576 ON READER SERVICE CARD

America's most popular, most complete, and most affordable solution for the mail order business—order entry/review, credit card processing with draft capture, UPS manifesting, profit analysis, accounting, telemarketing, list management. Clipper compiled, dBase III + files. Single and Multi-user versions. Find out why more people buy MOM after comparing!
Demo kit $25 refundable deposit.

MailOrderManager™

Dydacomp Development Corporation
150 River Road, Suite N1, Dept. PCM
Montville, NJ 07045
1-800-858-DMOM
201 335-1256

CIRCLE 571 ON READER SERVICE CARD

Voice Mail Cash Machine

Make thousands of dollars effortlessly by installing our voicemail in your 286/386. Use to answer your home office phone, rent pocket-pagers, advertise products or operate a pay-per-call service using credit cards, passwords or a 900#. Systems start at $295.

Call 24 hours: 800.283.4759
Int'l & Demo line: 818.718.9560

DemoSource™
The Voice Application Software
8345 Reseda Blvd. Ste 202
Northridge, CA 91324 USA

CIRCLE 573 ON READER SERVICE CARD

The practical guide to CD-ROMs

"...a superb concept...packed full of names and descriptions across a wide spectrum of subjects... deserves the support of the publishing community and consumers... a readable newsletter with a lot of meat, at a very low price."
–CD-ROM Professional

- News
- Reviews
- Previews
- Bugs, gotchas, workarounds
- Over 200 titles every issue
- Best and worst
- Guide to prices
- The *essential* periodical for the CD-ROM and multimedia enthusiast

iN! indelibleNews!

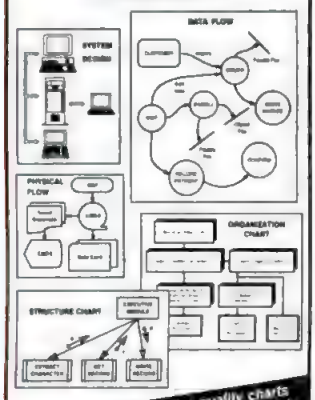
1 year
(12 issues) just
$29.95
($39.95 outside USA)

156 Fifth Avenue Suite 228
New York NY 10010
TEL 212/ 255.1956
FAX 212/ 255.1735
EMAIL CIS 76646,1454
or 74737,2347

or circle no. 650 on Reader Response card for a *free* sample issue

CIRCLE 575 ON READER SERVICE CARD

RFFlow
Professional Flowcharting
For Microsoft® Windows™



Create professional, fine quality charts quickly and easily. Call for free trial disk: (970) 663-5787 FAX (970) 669-4889
$129.00
RFF ELECTRONICS
1053 Banyan Court Loveland CO 80538

CIRCLE 572 ON READER SERVICE CARD

The Mail Order Wizard™

Everything you need to manage your growing phone-order or mail-order business.

- Order processing
- Inventory control
- Electronic charge processing
- Mail list management
- UPS/USPS manifest
- Financial reporting
- Ad/catalog analysis

Call 800-676-0098
for free info or
$20 refundable demo.

The Haven Corporation
1227 Dodge Ave., Suite PMC5
Evanston, IL 60202-1008
708-869-3553

CIRCLE 574 ON READER SERVICE CARD

F•R•E•E

Voice Processing Software

That's right! Just buy a Rhetorex 4 line voice card ($995) and receive a complete LaserVoice working demo absolutely free. With manual. Demo actually answers calls. Includes software for telemarketing, talking classifieds, fax on demand, auto-attend, voice-mail, and more.

Upgrade to full version for only $995. All Rhetorex boards come with a 3 year warranty.

Other software available:

- ZipFinder: Finds business location by zipcode
- CallNet: Toll free calling network

ORDER TODAY!

216-253-8787

FREE TECHNICAL SUPPORT

Amerifax 572 W. Market St. #5, Akron ,Ohio

CIRCLE 577 ON READER SERVICE CARD

Gamma UniType™

Localization Kit for Windows

Type foreign languages in your favorite Windows applications as easily as you type English!

*From $99.95. **Here's our guarantee:** If you are not comfortably using your language of choice within 30 days, return the product for a full refund.*

European, Cyrillic, Asian, Middle Eastern, Indian, Biblical & more – scalable fonts for all the world's languages.

Call the Win Language™ experts!

Ask about our Expert Translation Service and Products!

Gamma Productions, Inc.
12625 High Bluff Drive #218, San Diego, CA 92130
Sales: 800-97-GAMMA Tel: 619-794-6399 Fax: 619-794-7294

DIGITAL SERVICE BUREAU

Slides • Overheads
4x5's • Big Posters
Canons • Dyesubs

Photo CD™

Professional Proofing Scans
35mm format $.60 Pro 4x5 $8

DIGITAL 4-Color Offset Printing
Short Run Press...Call For Info

Satisfaction Always Guaranteed

IMAGERS
(800) 232-5411
1575 Northside Dr. Suite 405 Atlanta 30318

CIRCLE 580 ON READER SERVICE CARD

Home Study

ACCREDITED B.S. DEGREE in Computer Science

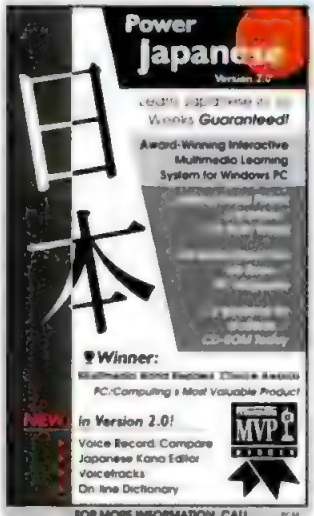
Easy-to-study lessons in Multimedia, C, C++, Visual Basic, Assembly Language, Unix, Database Design, Cobol, Ada, Pascal, & many more lead to the only home-study BSCS degree accredited by an agency recognized by the U.S. Department of Education.

Professional software & hardware provided at no extra charge. Programs in Computer & Electronics Engineering Technology as well. Over 44 years experience. Accredited by the Distance Education and Training Council.

Free Catalog: 1 (800) 955-2527

GRANTHAM College of Engineering

Grantham College Rd., Slidell, LA 70469-5700



CIRCLE 579 ON READER SERVICE CARD

Key-Lok™ Security

- ☐ Fighting piracy since 1982.
- ☐ Algorithmic response
- ☐ Programmable memory
- ☐ Very economical
- ☐ Device transparent to PARALLEL /SERIAL port
- ☐ Multiple security layers
- ☐ Counters/Real-time clock
- ☐ Multiproduct licensing
- ☐ DOS/UNIX/VMS/etc

Access Control System

Diskette Drive Locks

Microcomputer Applications
3167 E. Otero Circle
Littleton, CO 80122
TEL: 1-(800)4KEYLOK
(800-453-9565)
FAX: (303) 770-1863

CIRCLE 581 ON READER SERVICE CARD

WE PRINT

BIG COLOR POSTERS

FROM COMPUTER FILES
PHOTOGRAPHS - DRAWINGS
Big Color Postscript Prints
At An Affordable Price

800-860-4950
Limelite Electric Arts

- Signs
- Portraits
- Sales Displays
- Graphic Arts
- Backlit Exhibits
- Product Promotion

Fast Service

CIRCLE 882 ON READER SERVICE CARD

B.S. & M.S.
In Computer Science

Get the opportunity and earning power a college degree confers—without leaving home and without spending thousands of dollars.

- ALL COURSES HOME STUDY
- Approved for tuition reimbursement by leading corporations
- Increase your earning power
- Join students from leading computer companies
- Using Windows, C++ and Ada courses available
- Career*Path* training in computer programming available

AMERICAN INSTITUTE COMPUTER SCIENCES

ACCREDITED MEMBER World Association of Universities and Colleges

For free information call **1-800-767-AICS**

SURFCAM 3DSTUDIO TANGO AUTOCAD

MASTERCAM TRADESTATION

FEAR NO HARDWARE LOCK

Hardware lock removal specialists

ANY RAINBOW SENTINEL LOCK

609-390-2799
609-390-3750 FAX

IMAGINE THAT

One Evergreen Drive
Seaville, NJ 08230

CIRCLE 578 ON READER SERVICE CARD

CrypKey Software Licensing System "Hardware key protection without the hardware key"

CrypKey is a ***software protection tool***, offering ● complete security from any disk copy program ● complete compatibility with any MS-DOS or MSWINDOWS based machine ● complete invisibility - no disk key, no hardware key, less support calls ● instant disaster recovery ● protect programs distributed on CD-ROM, BBS, or Internet!

CrypKey is a ***sales tool***, allowing you to sell your program ● by increments - enable the options the customer purchased ● by number of runs - e.g. sell 100 calculations for $100.00 ● by time period - e.g. lease or demo your program for 60 days. CrypKey uses a numeric key that can be transmitted by phone, fax, or email.

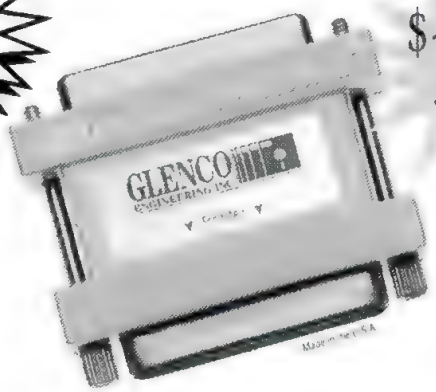
Sell your customers more options, more copies, more time or more runs instantly, just by making a telephone call (great for overseas customers or distributors) CrypKey is produced by Kenonic Controls Ltd. - engineering and software since 1972.

Kenonic Controls Ltd.
7175 - 12th Street S.E.
Calgary, Alberta, Canada T2H 2S6
Ph.(403)258-6200 fax:(403) 258-6201

CIRCLE 583 ON READER SERVICE CARD

Lighten Up!

SEE US AT COMDEX SPRING/ WINDOWS WORLD '95 BOOTH N6354



Only $19.95 Qty. 100

Introducing Hardlock LT™. The light price will brighten your day.

New Hardlock LT is the perfect copy protection system for your high volume lower-priced software. Hardlock LT features the same premium support, compatibility and reliability as our unsurpassed Hardlock system -- complete with 128 bytes of memory and the same ASIC security found in most other copy protection systems on the market today.

Compare Hardlock LT to all the others. You'll be amazed. Call now for an evaluation kit.

1979-1994 15 YEARS OF EXCELLENCE GLENCO

Over 2.5 million protection keys securing software worldwide

1-800-562-2543

GLENCO ENGINEERING INC.

SERVING THE SOFTWARE INDUSTRY SINCE 1979

Software Protection • Data Security

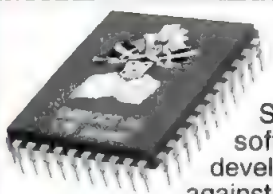
Over 10,000 developers Relying on Glenco

Systems available for DOS, Windows, Windows NT, OS/2, Unix, Xenix, DES, Single User, Network, CD-ROM & More

Call 708-808-0300 or Fax 708-808-0313 for a distributor in your country.

©1994 Glenco Engineering, Inc.

CIRCLE 584 ON READER SERVICE CARD



EVERLOCK 3.0 - The Leader In Software Security

Since 1986, EVERLOCK has been the industry leader for software based copy protection systems. Thousands of developers have chosen EVERLOCK as their weapon in the fight against software piracy. Why? Because EVERLOCK offers you the ultimate in security, compatibility, ease of use and transparency at affordable prices.

The release of ***EVERLOCK version 3.0*** sets a new standard for others to follow. New and enhanced features include:

Program Encryption • CPU-Lock • Registration Info • Password Access • Serialization • Remotely Resettable Access Flags, Date Limits, Execution Count and Network User Limits • Program Compression • and much more!

Call today and ask about our low cost Trial Kits. A free demo is also available.

(800) 227-0644

AZ

Az-Tech Software, Inc. - *Leaders In Software Security*
201 East Franklin Street, Suite 11, Richmond, MO 64085-1883
(800) 227-0644 • (816) 776-2700 • FAX (816) 776-8398

Hardware based copy protection systems are also available!

CIRCLE 585 ON READER SERVICE CARD

Sentinel

The Worldwide Standard in Software Protection

SUPPORT TECHNOLOGY QUALITY RELIABILITY SENTINEL

Protection From The Leader

More developers rely on Sentinel®, from Rainbow, than any other software protection in the world.

And for good reason. Sentinel leads the industry in technology, quality, reliability and support.

So when it's time to protect your DOS, OS/2, Windows, NT, Macintosh, UNIX, XENIX, LAN or CD-ROM application – protect with Sentinel. Protect with confidence.

Only Sentinel Delivers:

- The Most Advanced Protection
- Protection For Any Platform
- Highest Quality & Reliability
- True Transparency For End Users
- Support From The Industry Leader

Order Your Sentinel Developer's Kit Today!

SENTINEL
Securing the future of software

Call 800/843-0413

Tel: 704/542-6680 • Fax: 704/542-6022

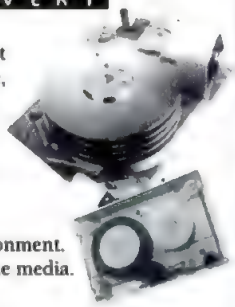
RAINBOW TECHNOLOGIES

Offices & distributors located worldwide.

©1994 Rainbow Technologies, Inc. Sentinel is a trademark of Rainbow Tech

CIRCLE 629 ON READER SERVICE CARD

Ontrack® DATA RECOVERY

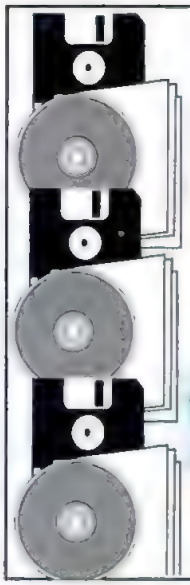


- Ontrack Data Recovery can recover data lost due to: Data corruption, mechanical failure, electrical surge, virus infection, water and fire damage.
- 24-Hour worldwide support with weekend, priority, and on-site service available
- Expertise in virtually every operating environment. Service is also available on tape & removable media.
- Drive & tape warranty preserved by major manufacturers! Call for more information.

MN: 1-800-872-2599 • CA: 1-800-752-7557

UK: +44 (0)181 974 5522 · Germany: 0130 815 198 · France: 05 90 72 42 · Japan: (0429) 32-6365
6321 Bury Drive, Eden Prairie, MN 55346 • 2400 Main Street, Suite 200, Irvine, CA 92714

CIRCLE 586 ON READER SERVICE CARD



Total Project Management for Software Manufacturing and Information Distribution

- Diskette & CD-ROM duplication services
- Equipment sales & servicing
- Electronic publishing services
- Bulk media sales (brand & generic)
- On-demand printing
- Packaging, assembly & distribution

100% money-back guarantee!
Superior quality, fast turns & best pricing

MEGASOFT
Servicing the corporate and software communities for over 11 years

819 Highway 33 East, Freehold, NJ 07728
Tel: 800 MEGASOFT Fax: 908 462-5658
Internet:www.megasoft.com

CIRCLE 599 ON READER SERVICE CARD

Lost your data?
Don't panic, call
DATA MECHANIX
800-886-2231
The Data Recovery Experts

Virtually every operating system
DOS
Mac
Novell
Unix
OS/2

✓ **24-hour**
✓ **weekend**
✓ **priority**
✓ **on-site** service available

clean-room facilities
all work done in-house

16271 McDurmott Street, Suite B, Irvine CA 92714

CIRCLE 587 ON READER SERVICE CARD

DATA CONVERSION

DISKS • TAPES • CARTRIDGES
CONVERSION•DUPLICATION•SCANNING
MORE FORMATS THAN ANYONE !
Quick • Reliable • Quality
WORD PROCESSORS, MINIS
MICROS, SPREADSHEETS
DATABASES, MAIL LISTS
IBM, DEC, APPLE, WANG
HP, WordPerfect, MS-Word
Lotus
Dbase
MICOM
LANIER
CPT, NBI
DISPLAYWRITER
8/4MM, XEROX, CP/M, UNIX ...

NATIONAL DATA CONVERSION
5 East 16th Street, New York, NY 10003
(212) 463-7511
AMERICA'S LEADERS IN DATA CONVERSION

CIRCLE 588 ON READER SERVICE CARD

CPR Recovery Services

No Recovery No Charge
98% Success Rate
Manufacturer Trained Technicians
All Storage Devices & Operating Systems
Since 1981

We Successfully Recover Data From Drives With:

- *Bad Motors*
- *Electronic Failure*
- *Mechanical Problems*
- *Damaged Heads*
- *Missing or Bad Boot Sectors*
- *Damaged or Missing Partitions*
- *Damaged or Missing FAT's*
- *Damaged Directory Structure*
- *Accidental Mishandling*
- *Fire & Flood Damage*

Data Recovery Software & Training Also Available

Computer Peripheral Repair & Recovery Services, Inc.
11440 Okeechobee Rd. Suite 201 Royal Palm Beach, FL 33411
800 765-9292 USA (407)796-7266 888 (407)791-2189

CIRCLE 591 ON READER SERVICE CARD

E-Mail/Gopher/WWW
Telnet/FTP etc.,.
Dial-up/Slip/PPP
Free slip software
FREE* Internet

Just log on and open your account on-line
1-217-322-1111
16.8K 8/N/1
Full Internet Connection
* Long Distance Charges Apply

CIRCLE 593 ON READER SERVICE CARD

DATA CONVERSION

If you want the most complete conversion services in the industry, just call...

(800) CONVERT
Capabilities include over 6000 formats

PIVAR
COMPUTING SERVICES, Inc.®
165 Arlington Heights Rd. #M
Buffalo Grove, IL 60089
(708) 459-6010

DATA RECOVERY IN HOURS.

- Over 10 years of experience with clients including HP, NASA, & FedEx.
- We've recovered more than half-a-million megabytes of lost data.
- We guarantee successful data recovery, or you pay nothing.
- One-Day turnaround is available.
- Call 24-hours a day.

LAZARUS
DATA RECOVERY
800-341-DATA
Ask for the Lazarus Technical Data Recovery Guide
415-495-5556 • FAX 415-495-5653 RESTRICTIONS MAY APPLY
381 Clementina Street • San Francisco, California 94103

CIRCLE 589 ON READER SERVICE CARD

DATA RECOVERY

"We tried all the utilities and nothing worked. Total Recall recovered 100% of our data and returned it the same day. These guys are amazing!" -R.H. Baiocchi Inc.

- DOS, Mac, Novell,
- Optical, Syquest, Bernoulli
- Class 80 Clean Room
- Best Success Rate
- Recommended by Major Manufacturers

The Data Recovery Company™
TOTAL RECALL™
800.743.0594
Saving Data Since 1988
2462 Waynoka Rd. • Colorado Springs, CO 80915
719 380 1616 • Fax 719.380.7022

CIRCLE 590 ON READER SERVICE CARD

Free Internet "800" ACCESS

- Great for Travelers & Rural Users
- No Signup cost or hourly Internet Usage Fees
- Full Internet Access
- Text or GUI
- Modem Speeds to 28.8
- Free Tech Phone Support

Save On Long Distance

A Service of
International Internet Association

PAY ONLY THE WHOLESALE RATE FOR 800 TIME.
50% UNDER NORMAL LONG DISTANCE RATES.
To Sign Up or For More Info call:

1-800-669-4780
Fax 1-800-928-1057 e-mail: info@iia.org

CIRCLE 592 ON READER SERVICE CARD

RAPID REPRODUCTION
SIMPLE-FAST-SMART- RELIABLE
MANUAL DISKETTE DUPLICATORS
AX 1400-$1,895 AS SHOWN

AX 1000 - 2000 SERIES
- FORMATS, COPIES VERIFIES
- 360 5.25" hr 180-3.5"/hr
- COPIES ALL MFM FORMATS
- RELIABLE TEAC DRIVES
- AVG 100,000 COPIES/DRIVE
- STAND ALONE OPERATION
- 1 YEAR WARRANTY

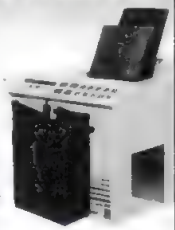
AXIOMATIC TECHNOLOGIES CORPORATION
4995 Timberlea Blvd ,Mississauga
Ontario, Canada, L4W 2S2
(905)602 9270 Fax: (905) 602 9279

CIRCLE 595 ON READER SERVICE CARD

SOFTWARE LABS
The Technology Experts
DISKETTE DUPLICATION
Guaranteed Low Prices
High Quality Media
Fastest Turn-Around
Custom Labels & Sleeves
BLANK/FORMATTED DISKS
FULFILLMENT SERVICES
Custom Package Design
Packaging & Assembly
Fulfillment Shipping
The Total Turn-Key Solution
at the Lowest Possible Prices!
800-755-7551
The Software Labs
8700 148th Ave. NE, Dept. D
Redmond, WA 98052

CIRCLE 598 ON READER SERVICE CARD

DUPLICATION EQUIPMENT



For-in-house duplication, *MediaFORM* is the source We sell and service high-quality software duplication and labeling equipment. And we can tailor a complete, cost-effective system to meet your specific needs.

MediaFORM™
800-220-1215
610-458-9200 • Fax: 610-458-9554
LEASE & RENTAL PLANS AVILABLE

The Fastest Turnaround! ★★★ High Quality Media!
DISKETTE DUPLICATION
Confidential Reliable, Worry Free Service!
SOFTWARE PACKAGING SUPPLIES & FULFILLMENT
Printed Sleeves, Labels, Vinyl Pages, Mailers, Licence Agreements, Shrink Wrapping, Mailing, etc
CD-ROM MASTERING & DUPLICATION
One-off CD, Small and Large Volume duplication and Packaging
MEDIA CONVERSIONS
2500 Word Processing Formats, Disks, 9-Tracks, 3480 Colorado, QIC-80, 8mm, 4mm DAT, TK50, OCR Scanning
BLANK DISKS/CD-ROM's
Will beat any advertised price!
COMPANY COMPENDIA Inc.
1-800-374-DISK
Ph: 312-419-8771 Fax: 312-419-1390

CIRCLE 594 ON READER SERVICE CARD

DISKETTE DUPLICATION
FROM $.49
HIGHEST QUALITY MEDIA
- 3.5" and 5.25" Formats
- Custom Labels/Shutter Printing
- Diskette Mailers/Accessories
- Assembly Services
- Bulk and Formatted Diskettes
- Generous Volume Discounts

CD ROM Duplication
- Pre-Mastering Services
- One-off/Small Volume Runs
- Large Volume Replication
- Packaging Accessories
- Blank CDR Media 63 & 74 Min.

800-255-3142
Diversified Systems Group, Inc
P.O. Box 1114
Issaquah WA 98027

CIRCLE 596 ON READER SERVICE CARD

Automatic Disk Duplicator

Standalone **$1,995**
Industrial quality duplicators at half the price. Copies up to 135 3.5" PC & Mac diskettes per hr.
1-800-887-9906
or (510) 689-1695
rates from $69 Lease, Rent, Trade-in
CopyPro *the low price leader*

DUPLICATION EQUIPMENT
- FULL LINE AT ALL PRICES
- NETWORKED SYSTEMS
- IN-LINE PRINTER
- LABELERS
- COLLATORS
- BAGGER
- CD DUPLICATION SYSTEM
- PCMCIA DUPLICATORS

Industrial Series (350 disks/hour)

Office Series (62 Disks/Hour)

Prices start at $695.00
Semi Automatic 3 1/2" or 5 1/4" Duplicator

Champion Duplicators Inc.
800-752-2145
California

ASHBY Champion

Ashby Industries
800-927-4297
Oklahoma

CIRCLE 600 ON READER SERVICE CARD

SOFTWARE DUPLICATION
Complete Software Manufacturing Solutions
- Duplication 100% Guaranteed
- Highest Quality Media & Equipment
- 24 Hour Turnaround
- Custom Labels/Sleeves/Manuals
- Packaging, Assembling & Shrinkwrapping
- Warehouse & Fulfillment
- Graphic Design & Advertising Services
- Ultra Competitive Pricing

APC, Inc.
800-666-1007

CIRCLE 597 ON READER SERVICE CARD

SOFTWARE DUPLICATION
IN-HOUSE PRINTING
PRODUCT ASSEMBLY
THE COMPLETE SOURCE FOR YOUR SOFTWARE PRODUCTION NEEDS!
1-800-410-7555 Ext. 14
Copy INCORPORATED
4278 S 500 W.
SALT LAKE CITY, UT 84123

FREE CBSI 486 Business Computer

Earn $4,000 Per Month From Your Home With A Computer!

Quit spending money on your computer and let it earn money for you. This is a proven turnkey business an individual or couple can run. If you purchase our software and business program, we will give you the computer and printer. If you already own a computer, you may receive a discount. Begin part-time and still retain the security of your present position. We will provide free, home office training. Financing available.

To receive free cassettes and color literature, call toll-free:
1-800-343-8014, ext. 318
Computer Business Services, Inc.

CIRCLE 601 ON READER SERVICE CARD

adult CD ROM

Interactive Impressions is your complete source for the finest in adult interactive CD-ROM gaming entertainment.

Adv. of Seymore Butts 1	$54.95
Dream Machine	$54.95
Midnight Stranger	$54.95
Myst	$54.95
Nightwatch II	$49.95
NueroDancer	$54.95
Scissors N Stones	$49.95
Virtual Valerie	$69.99
Virtual Vixens	$54.95

Many Other Titles Available!

order your FREE catalog today!

1•800•321•6830

Interactive Impressions, L.L.C.
P.O. Box 241256 • Omaha, NE 68124-5256

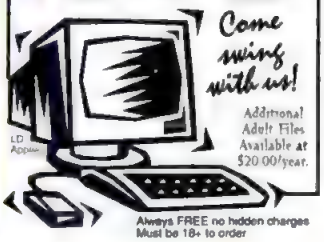
CIRCLE 619 ON READER SERVICE CARD

TRAPEZE

FREE ACCESS

Gay • Straight • Bi • Swingers
- Ultra HOT Chat
- Specializing in those curious about alternative lifestyles
- FREE downloads/E-mail
- Matchmaker
- Over 5,000 calls a day 40-60% female/male ratio
- Up to 16.8 on 32 lines

1-618-669-4227



Come swing with us!

Additional Adult Files Available at $20.00/year.

Always FREE no hidden charges
Must be 18+ to order

JetMaster

Save $$$ in Printing Costs

InkJet Refill System

The most efficient, **RE-USABLE** jet printer recharge kit available. **Lowest cost per recharge in the world.** Buy one kit, then just buy ink as needed. Available in 2 oz., pint, or gallon size. Ink costs as low as $1.00 per recharge. Waterproof inks available. Most jet printers supported.

BJ3 (Stylewriter, Canon BubbleJet)	$29.95	JM6 MCI HP Color & Black (BJ-600-800) JM6 (HP500) Also supports high Cap. Cart	$69.95
Also supports high Cap. Cart	39.95	Color Jet Ink (2 oz.) (60cc)	11.50
Black Jet Ink (2 oz.) (60cc)	10.50	BJ6-MCI Color & Blk (BJ-600/800)	49.95

[redacted]

Computer Friends
14250 NW SCIENCE PARK DR.PORTLAND, OR 97229
TEL. 503 626 2291 FAX 503 643 5379

CIRCLE 602 ON READER SERVICE CARD

BBS

EVENT HORIZONS

503-697-5100

96 Lines 28.8K bps

Best graphics images and movies in the world!

World wide chat and party lines!

MUST BE ADULT TO ORDER

CIRCLE 612 ON READER SERVICE CARD

HEAT IN THE NITE!

America's only *FREE*, no membership fee *ADULT BBS*, 1000+ calls daily, 10,000+ users. 60:40 male-female ratio. 14.4K modes, 32 lines! *ACTION* 24 hrs a day guaranteed. The casino where *EROTIC* singles and couples *MEET*!

NEVER A CHARGE! HOT!

One of the nations top 100 BBS's as rated by Boardwatch Magazine!

1-515-945-6227

Must be 21 to access

SINCE 1986 media source

DISKETTES, DATA CARTRIDGES, OPTICAL DISKS, CD-R'S, MULTIMEDIA KITS, CD ROM SOFTWARE, ACCESSORIES & MORE

DISKETTES

100% Guaranteed

	OEM/DUPLICATOR GRADE	PC GRADE
	BULK	FORMATTED
5.25 DS/DD	28¢	26¢

CALL FOR SONY, VERBATIM & BRANDED PRICES
All 5.25 include sleeves. Prices on lots of 100. Lower on higher quantities

Verbatim 2120 QIC80 F $8.59* ea
*with $3.00 Rebate

800-356-2553
FAX (404) 919-9228

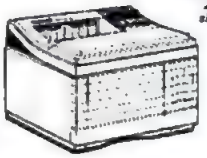
CIRCLE 603 ON READER SERVICE CARD

HP, IBM, Canon, Epson, NEC, Apple

TONER

Cartridge Remanufacturing for Laser Printers

prices from $45 ship incl.



MICR toner, fonts, software for check printing.

1-800-722-2804

ADVANTAGE LASER PRODUCTS, INC. Est. 1987

2030 Powers Ferry Rd. Suite 230
Atlanta, GA 30339

CIRCLE 604 ON READER SERVICE CARD

Where Adults Come To Play!

The World's Choice For HOT MODEM FUN!
- Great For Couples and Singles!
- CHAT LIVE With Thousands of Ladies and Gents in Groups or Private!
- Tons Of Sizzling Hot Message Areas!
- Large GIF and Shareware Libraries!
- Matchmaker "DATING-BASE"!
- Live Competitive Tournament Gaming!
- NEW Modem to Modem Gaming!
- Local Numbers In Over 800 Cities!
- Plus Much Much More!

ODYSSEY ONLINE

CALL NOW BY MODEM For Special Promos & Information On Our Newest Features Including INTERNET Access!

Over 21 818-358-6968 8/N/1

CIRCLE 625 ON READER SERVICE CARD

FREE NO PROTECTION FREE

Required at

HOTEL CALIFORNIA

"The Premiere West Coast BBS"

- Over [illegible] Lines Available
- Over 250,000+ Adult Files including Text Files and Shareware
- Advanced Standard Chatlines with World-class
- FREE Internet Gateway
- News, Weather & Sports Section
- Online Matchmaking
- And Much, Much More

Immediate Access Via Credit Card

ADDED BONUS
1. FREE Trial Access
2. FREE Voice Mail
3. FREE Accounts for Women

Set your Modem to 8-N-1 and Dial

CIRCLE 623 ON READER SERVICE CARD

DIRECT

PC Magazine Marketplace Shoppers buy direct. In the last 12 months, half of the computer products and services they bought, they bought direct.

Advertise Here, Where Brand Specifiers Buy Direct!

Call 800-825-4237 Today!

UNBELIEVABLE!

No more aches & pains

Recline! Get Productive! Let the PowerStation® ergonomic desk support you!

Only $350/unit–volume discount
Relax at PowerStation®!

METAMORPHOSIS
800-700-9141

CIRCLE 605 ON READER SERVICE CARD

The Box Of Love

The Ultimate Erotic!

BBS Voyage

1-900-544-0014

2.99 per min. Must Be 18 to Access

Call from home or office via Modem 8-N-1 Up to 28,8 Bps

The Box of Love is Open 24 Hours a Day

No Credit Card Needed

The Megabyte Melt Down Experience!

FREE

BodyCello

ADULT CATALOG!

Call, write or FAX for your free 45-page color catalog! Outside the U.S. and Canada send $5 s/h.

BodyCello CD Sampler*

You get over 140 full-screen, beautiful, nude color photos and artwork. Plus, check out our new interactive titles.

MAC/MPC #777, $8.95*

MAC	PC	CD-ROM Title**	Price
2-225	2-225	Seymore Butts 2	$49.95
2-430	3-430	Midnight Stranger	59.95
2-432	2-432	Big B•••m Buddies	39.95
2-101	2-101	Heavenly Bodies v.3	39.95
2-222	2-222	Couples	39.95
2-427	3-427	Penthouse Interactive	79.95

* Add $2.00 s/h for the BodyCello CD Sampler in U.S. and Canada. Outside the U.S. & Canada add $5 s/h.

** Add $5 s/h in the U.S. and Canada. Outside the U.S. and Canada add $15 s/h.

Some titles available in diskette versions.

1-800-922-3556

Must be 21 to order. Dealer inquiries welcome

BodyCello • Box 910831 • Sorrento Valley, CA, 92191

Info: 619-578-6969 • FAX 619-536-2397 PM

CIRCLE 618 ON READER SERVICE CARD

UNLEASH THE POWER OF YOUR MODEM

The Exchange®

Bulletin Board System

The only all-in-one BBS you'll ever need!

Adult Photos (Gifs)

Animated Adult Movies

Thousands of Free Programs

Modem: 516/579-5550

CIRCLE 624 ON READER SERVICE CARD

FSU BBS

Fantasia Services Unlimited

You've Tried Bigger

Now Try Better...

FREE Trial Accounts

Huge ADULT Library

22 CD-Roms Online

Over 15 GIGS of Files

LIVE HOT Chat

Personal Internet Email Accounts

USENET Newsgroups

User Voice Mail Boxes

28.8 Access Available

714.579.7022

18 or Older (ONLY) Voice Support Line (714)961-4335

Discreetly Billed

CIRCLE 620 ON READER SERVICE CARD

Sexy Software™ SEXY DISKS™

Sexcapades™ . . . The GAME

The First Adult Game with TRUE SOUND and 256 Color VGA Graphics

For that evening you won't forget with a sexual one or group of—let's face friends. Build your sexual fantasy. Find out how your partner would really like to make love. Over 80 Color VGA Scenes • Real Voices Guide the Action • Play with 7 8 Close Friends. SoundBlaster™ supported!

SPECIAL SALE PRICE $49

NEW! Sexcapades . . . the Mini-Movie

See the resolution of a QUAD SPEED CD ROM on your disk drive the first movie using a 600K sec transfer rate we have created a 40MB movie containing the best scenes from our Sexcapades movie you can install the movie to 12MB scenes to conserve disk space shipped on 25 1 44 MB disks SoundBlaster support Regular Price: $65.

SPECIAL INTRODUCTORY PRICE $49

NEW! 101 Shots – We have picked 101 of the hottest pictures in 800 X 600 SVGA from our library of over 1 million pictures! Only for the truly discriminating collector Regular Price $49

SPECIAL INTRODUCTORY PRICE $35

Now You Can Have Your Own GIRLFRIEND™

. . . a sensuous woman living in your computer!

First VIRTUAL WOMAN You can watch her talk to her ask her questions and relate with her Over 100 actual VGA photographs allow you to see your girlfriend as you ask her to wear different outfits, and guide her into different sexual activities. An artificial intelligence program with a 3000 word vocabulary that GROWS the more you use it She will remember your name your likes and dislikes GIRLFRIEND comes with the best software and GIRLFRIEND LISA. Req 10MB of free space

SG3 GIRLFRIEND Special Introductory Price $69. FREE Second GIRLFRIEND Just Added

NEW! SG7 GIRLFRIEND TERI 300+ PICTURES $79. • NEW! Soundblaster Voice Kit $29.

ORIGINAL Sexy DISKS – 6 disk set with movies pictures games $32

ADD $4 S/H • 3.5" Or FOREIGN ORDERS ADD $2/DISK • IN PA ADD TAX • MUST STATE AGE OVER 21 YEARS

VISA/MC Orders Only: 800-243-1515 Ext. 600DI / 24 HRS / 7 DAYS

FAX (215) 997 2571 • Or CK/MO to Sexy Software, P.O. Box 220 , Dept 600DI, Hatfield, PA 19440

Sexy Software™ SEXY CD-ROMS™

SUPER CD-ROM SALE

ALL CD-ROMS: $59 EACH OR 3 FOR $149

Sexy INTERACTIVES

Sexy CD A - ORAL FIXATION the first INTERACTIVE STILLS CD-ROM database allows viewing by YOUR grade category description date viewed 1000+ SVGA pictures not on any other disk

Sexy CD B - PLAN 69 FROM OUTER SPACE – interactive science fiction sex extravaganza! 2 movies in 1 play new movie or play enhanced movie with scenes from original Plan 9 From Outer Space also create animated GIFS from movie

Sexy CD C - P**NMANIA 2 CD set contains 1200 MB of European movies in DOS and Windows with a fantastic adult arcade game containing 4 adult games within the master game nothing else compares to this disk!

Sexy FLIX

FULL LENGTH DIGITAL MOVIES - FULL SCREEN VIEWING

Sexcapades . . . The MOVIE – See incredible uses of a mouse and a joystick in an amateur movie of our Sexcapades game

• KING D. Dirtiest dinosaur movie ever made • TOO NAUGHTY TO SAY NO Harry Reems and Georgie Lyon • SEX GAMES Hardcore swingers dating service

NO HARD DISK SPACE REQUIRED – WINDOWS NOT REQUIRED

Sexy PIX™

Sexy CD #1 the premiere adult collection 650 MB of action with over 2500 VGA pictures, stories, cartoons, games, sound files, DARE TO COMPARE!

Sexy CD #2 an exclusive collection containing over 1000 Super VGA pictures (1024 x 768 x 256) and over 300 MB of true 24 bit color The women and the quality are stunning

Sexy CD #3 another collection of over 650 MB of the hottest pictures available. Over 3 000 VGA pictures, movies and utilities

MENU DRIVEN VIEWING – NO DUPLICATION

MIX & MATCH CD-ROMS

ASIAN LADIES, AMOROUS ASIAN GIRLS, B. BABES 1 & 2, NIGHTWATCH 1 & 2, DREAM MACHINE, NEURODANCER, WINNER TAKE ALL, SEYMOUR BUTTS, DEBBIE DOES DALLAS, BODACIOUS BEAUTIES, 3D DREAMGIRLS, HOT PIX 3, 4, 5, TOTAL FANTASY, VIRTUAL VIXENS

CIRCLE 607 ON READER SERVICE CARD

DIRECT YOUR ULTIMATE FANTASY

Interactive Video Conferencing

FREE MegaMorph GIFs

Real Time Video AVI's

CD-ROM Titles

Virtual Fantasies LIVE!

The 42nd St. Peep Show on YOUR Computer!

908-972-4806 (8-N-1)

Voice Support: 908-972-4949

This is NOT a 900 number! You must be 21 or older.

CIRCLE 610 ON READER SERVICE CARD

The GAY Online Center of the Universe

Access Numbers Across America & Around the World!

It's Fabulous!

For Your Local Number & Logon Instructions call:

(800) 949-2668 (voice)

or

(415) 703-8200 (modem)

It's All Gay!

Your Internet Connection!

telnet:

bbs.eyecon.com

(204.94.37.2)

http://www.eyecon.com

Accept No Substitutes!

EYE CONTACT

Gay owned & operated

Serving the Gay Community for over 6 years!

Adults Only

CIRCLE 608 ON READER SERVICE CARD

Secret City MULTIMEDIA, INC.

KNOWLEDGEABLE STAFF! FAST DELIVERY! WORLDWIDE SHIPPING!

2 FREE CD-ROM ADULT SAMPLERS!*

*PIXIS DIGITAL EROTICA & NEW MACHINE PUBLISHING: A TASTE OF EROTICA

34 SAMPLES OF THE FINEST IN ADULT ENTERTAINMENT, ONLY $6.75 S/H, PHONE OR MAIL ORDER!

PIXIS INTERACTIVE

all new! • SPACE SIRENS** (VIRTUAL VIXENS 2) Interactive...$48.99 • all new! VIRTUAL VIXENS** Interactive...$38.99 --- NEURODANCER** Interactive...$38.99

**USES TRUE 3D TECHNOLOGY - TOUCH AND FEEL USER INTERFACE) - A CYBERSEX SIMULATOR THAT ENABLES THE USER TO TOUCH AND SEXUALLY INTERACT WITH VIRTUAL GIRLS IN THE FIRST PERSON POINT OF VIEW

PIXIS INTERACTIVE

DIRTY DEBUTANTES Interactive	$44.99	FISHERMAN'S WIFE Movie	$29.99
DREAM LOVERS GAY Interactive	$59.99	HIDDEN AGENDA Movie	$29.99
DREAM MACHINE Interactive	$47.99	MURPHIE'S BROWN Movie	$29.99
MADDAMS FAMILY Interactive	$42.99	NEW WAVE H**K*RS 1 or 2 Movie	$23.99
NIGHTWATCH 1 or 2 Interactive	$38.99	ULTRASEX 1, 2, or 3 Movie	$29.99
PENTHOUSE 1, 2, or 3 Interactive	$58.99	X-RATED FREAK SHOW Movie	$29.99
SAMURAI PERVERT Interactive	$47.99		
SCISSORS N STONES Interactive	$28.99	ADULT PALATE 2 Photos	$27.99
SEYMORE B*TTS 1 or 2 Interactive	$47.99	AMERICAN GIRLS 1 or 2 Photos	$27.99
VIRGINS 1 or 2 Interactive	$39.99	ASIAN HOT PICS Photos	$18.99
		ASIAN PALATE Photos	$27.99
A**L VISION 1, 2, or 3 Movie	$18.99	GAYWORLD 1, 2, or 3 GAY Photos	$39.99
BEVERLY HILLS 90256 Movie	$29.99	GIRLS OF VIVID 1 or 2 Photos	$21.99
BIKE BANG GAY Movie	$39.99	HOT HUNKS GAY Photos	$39.99
BUTTMANS EURO VCTN Movie	$15.99	MANPOWER GAY Photos	$39.99
CHERRY P*PPERS 1 or 2 Movie	$25.99	ORIENTAL 1, 2, or 3 Photos	$15.99
CURSE OF THE CATWOMAN Movie	$23.99	PENTHOUSE SELECT-A-PET Photos	$29.99
DAVID CD GAY Movie	$29.99	T & A to the Maxx #1 - 6 ea. Photos	$9.99

MUST BE AT LEAST 21 TO ORDER!

100's OF Hot TITLES IN STOCK!

800-643-4205

(818) 786-0995 • FAX (818) 786-7018

5818 Van Nuys Blvd., Van Nuys, CA 91401

CALL FOR FREE ALL NEW 32-PAGE COLOR CATALOG!

CIRCLE 609 ON READER SERVICE CARD

FREE GIFS

Download the "SEXIEST" & most "STIMULATING" Images from our ADULT On-Line Magazine - FREE !

LACE is an On-Line Magazine that offers you:

- ABSOLUTELY the best Color Photographs and Color Scans in the world & not available on any other BBS!
- COMPUTER MOVIES which playback in Windows. We offer both Video for Windows and QuickTime Movies. Download the runtime programs and a sample video file for FREE! Listen to our models talk to you and entice you.
- MULTIMEDIA FILES. Exciting Centerfold PhotoShoots, unfold right before your eyes set to exciting music!
- GORGEOUS Sexy Models both Amateur & Professional!
- LOCAL ACCESS #'s for over 1000 cities in the U.S.
- HIGH SPEED access available. (28.8k down to 2400 baud)

Set your Modem to 8-N-1 and your terminal emulation to ANSI

(818) 709-4275

Questions? Call our voice line at (818) 718-9977

LACE

the on-line adult magazine

May Only Be Accessed by Adults • Limited Offer

CIRCLE 611 ON READER SERVICE CARD

FREE* ADULT CD-ROM

We would like to send you our Photo Sampler #1 for FREE*. This CD-Rom features sample Color Images of Gorgeous and Sexy Models from our top selling Photographic CD-Roms.

*All we ask is that you send $4.95 to cover our postage and handling. OR

If you have a multimedia system you might want to try our Multimedia Sampler #1** which features both exciting Multimedia Presentations and Photographic Images from our Complete line-up of Cd-Roms.

**Only $9.95 plus $2.75 p/h.

(Orders outside of U.S. & Canada add $15)

To order: Send cash, check or money order

REG Publishing - Dept. MM1
Post Office Box 5138
Chatsworth, CA 91313

By telephone call (818) 718-9979.

We accept Visa, MasterCard & AMX. Program requires Windows 3.1. Multimedia requires sound card. Images may be viewed with Dos & Mac viewing programs.

Free Color Catalog Included - Adults Only!

ADULTS ONLY

CD ROM SOFTWARE PRODUCTS

Call 800-699-4263 Fax 802-767-3382
Int'l 802-767-3033 Source 10265

IBM INTERACTIVE

Cyber Peep Interactive	$19
Desktop Voyeur v.1	$49
Dream Girls CD	$28
Dream Machine CD	$54
Fantasies Interactive	$35
Girlfriend Teen CD-R	$46
Internet Strip Poker	$22
Midnight Stranger CD	$45
Mind Teazers CD	$32
Mustang Interactive	$49
Neurotic Cafe CD	$45
Nightmare Interactive	$32
Penthouse Interact 2	$49
Penthouse Interact 3	$59
Sexsations & Textures	$29
Space Wreck CD	$49
Spy Hole CD	$49
Strip Poker Pro CD	$30
Texas Table Dance	$39
Vampire's Kiss CD	$49
Virtua Valerie 2 CD	$42
Virtual Valerie CD	$39
Virtually Yours CD	$49
Wanderlust CD	$44

IBM FULL MOTION

Asian Invasion CD	$19
Blond Justice CD	$25
Candy Strippers CD	$29
Curse of Catwoman	$24
Dirty Debutantes CD	$24
Dirty Little Adult Gam	$34
Frontiers CD	$48
Hidden Obsessions	$25
Interactive Desires CD	$25
Love Bites CD	$25
Mystique Interactive	$24
Naked Edge CD	$26
Ultimate Erotica CD	$59

IBM STILLS

American Pie CD	$19
Asian Palate v.2 CD	$36
Euroticus CD	$42
Heavenly Bodies 1	$29
Lady in Spain CD	$29
Leather & Lace CD	$25
Private Video Mag v.1	$49
Rubber Fantasies CD	$29

MUST BE AN ADULT TO ORDER.
RESTRICTIONS APPLY CALL FOR DETAILS

PO BOX 234 DEPARTMENT 10265
ROCHESTER, VERMONT 05767

CIRCLE 616 ON READER SERVICE CARD

MEET GAY MEN

MAKE HOT GAY CONTACTS ON

THE MALE FORUM

Explore wild fantasies on the world's best adult chat system for men. Meet gay men within minutes of activation. Simple to use.

100% Private and costs less than .21¢ per hour

Live, active chat
Erotic classified ads
Adult Message areas
Hot personal questionnaries
You must be 18 years old

Modem: 516-689-0286 (Local access from 1000+ cities)
Internet: Telnet mforum.com or 166.82.150.41

SEXY MODEM

Call from home or office!

Top 100 BBS

The Ultimate BBS

FREE

- UNLIMITED ACCESS
- 100,000 Shareware & GIF's, Windows, Mac and DOS files
- Free Internet Accounts
- Sexy Network Chat with Singles and Couples
- Unlimited Downloads
- Up to 28.8k on all 160 Lines
- New GIF's posted daily by our photographers

1-217-792-3663

Use your Modem to access and be over 21 to access
Customer Support Voice Line 415-281-4429

CIRCLE 614 ON READER SERVICE CARD

Sexy Multimedia Online

3rd millennium BBS

High tech adult movies

Hot chat girls online

World's best graphics

Unsurpassed in sight & sound

Ultimate online experience!

Modem
503-636-2023

MUST BE 21 TO ACCESS

CIRCLE 613 ON READER SERVICE CARD

GOURMET GALLERY BBS

100% original gifs

thumbnails+closeups

50 new pics/week

7 online cd-roms

16 lines (1200-14.4)

7 gig of files

$2.75+/meg

no time limit

mc, visa, amex

408.956.5656

CIRCLE 617 ON READER SERVICE CARD

FREE Internet

- FREE PPP!
- FREE SLIP!
- FREE Shell!
- Get On-Line Immediately!
- Your personal Email Account
- 128 16.8K Modems
- WWW/Gopher/Telnet/FTP
- New User Help Menus
- Huge IRC/MUD/BBS Menus
- POP Mail, Full News Feed

1-217-792-2PPP

CIRCLE 615 ON READER SERVICE CARD

FOR ADULTS ONLY

You must be over 21 to access

LIFESTYLE

Meet sexy singles/couples on the world's hottest adult chat system – Lifestyle OnLine.

Less than .30¢ per hour.

Modem: 516-689-5390
Internet: Telnet lifestyle.com
(166.82.150.22)

AND

GRAFIX

Computer pictures so hot they could melt your modem

Modem: 516-689-2853
Internet: Telnet grafix.com
(166.82.150.31)

GAY MODEM

Top 100 BBS

FREE ACCESS

Unlimited Chat & Downloads

Gay Owned & Operated

Original Gay GIFs

Gay Chat with Hot Guys

Leather Shopping Mall

Matchmaker

Video Reviews

MUST BE 21 TO ACCESS

Video Stars...Donnie Russo, etc.

160 lines up to 28.8k

1-217-792-3671

Use your Modem to Dial
Customer Support Voice Line 415-281-3154

CIRCLE 630 ON READER SERVICE CARD

PC MAGAZINE MARKETPLACE BUSINESSCARD

PC Magazine's BusinessCard section is a forum for innovative, hard-to-find and low-cost PC products and services. Ads are listed by product category and include Reader Service numbers to allow fast, easy response.

RATES:
1 issue–$960, 3 issues–$840, 6 issues–$815, 12 issues–$770, 17 issues–$730, 22 issues–$720. Multiple-ad per issue rates also available. Prepayment must accompany each insertion. VISA/MC welcomed.

AD FORMAT:
PC Magazine will typeset each BusinessCard ad. Advertisers should furnish typewritten copy. Ads include: 1) Headline (1 line, initial caps=30 characters max, all caps=25 characters max), 2) Descriptive copy (5 lines, 225 characters max), 3) Company name (same specifications as headline), and 4) Address and telephone number (2 lines, 40 characters per line). No logos, artwork or camera-ready ads. Publisher reserves the right to edit supplied copy to meet section specifications.

DEADLINES:
PC Magazine is published 22 times a year, (bimonthly except for July and August). The BusinessCard closing is approximately two months prior to issue date.

Please send copy and payment to:
PC Magazine BusinessCard
One Park Avenue, 3rd Floor
New York, NY 10016
For more information, call 800-825-1237 *or* 212-503-5115, FAX: 212-503-5860.

[illegible]/BATTERIES

LAPTOP BATTERIES AND MORE
Batteries for Laptops, Notebooks, Powerbooks, Cellular Phones, Camcorders, Custom Rebuilds, Pulse Power Chargers for Cellular Camcorders that Eliminate Memory Effect. Call for Specs. Call Today Best Prices 1YR. Warnty Corp PO/V/MC

VRA BATTERIES
16541 Redmond Way #251 Redmond WA 98052
800-747-8876 24HRFax 206-881-8874

CIRCLE 651 ON READER SERVICE CARD

COMPUTER BATTERIES & MORE
Batteries for laptop/NB/PB, CMOS, camcorders, cameras, RC vehicles, toys, cordless phones/drills/shavers, cellular, remotes, pet fences. UPS/LANS, Ni-Cads, chargers, etc. WE REBUILD! CALL & ASK! WHOLESALE! V/MC/AmX/Dscvr/POs.

BATTERY EXPRESS
713 Gladstone St., Parkersburg, WV 26101-5661
800-666-2296/304-428-2296 fax: 304-428-2297

CIRCLE 662 ON READER SERVICE CARD

INCREASE YOUR BATTERY LIFE!
Your "2-Hr" battery only lasts 1 Hr? Try our 3000+ Long-Life Batteries, Chargers & Car Cords, for Notebook, Cellular, Camcorder. Battery Boost Software $25! Order FREE catalog/guide to longer battery life! Best Prices, 1 Yr Wrnty, V/MC/PO.

POWER EXPRESS
3 Portola Rd., Unit A, Portola Valley, CA 94028
Order 24hrs/Day! 800-769-3739 F415-529-0140

CIRCLE 653 ON READER SERVICE CARD

COMMUNICATIONS

Internal 14.4 Fax-Modem W/Voice
SPECIAL LOW PRICE OFFER
Includes Software for Modem, Fax, and Voice functions. Excellent Documentation.
Single Purchase: $69.00 For Two: $130.00 (+s/h)
Ask about M/M Starter Kits, Hard Drives & more...

MICROVISION INTERNATIONAL
1-800-281-1081
We welcome dealer inquiries for resale!

CIRCLE 664 ON READER SERVICE CARD

KEYBOARD, VIDEO, MOUSE
EXTENSION with EXTENDER
SPLITTING with COMPANION
SWITCHING with COMMANDER
Boosts SIGNALS UP to 600 FT. Control Up to 99PC's with one KEYBOARD and MONITOR.

CYBEX CORPORATION
4912 Research Drive, Huntsville, AL 35805
PHONE 205-430-4000 FAX 205-430-4030

CIRCLE 655 ON READER SERVICE CARD

INPUT/DATA ACQUISITION/BAR CODE/ POS

PCMCIA BAR CODE READER
PC Card Type Bar Code Reader for your Laptop or Desktop with Type II PCMCIA slot. Available With Low-Power or Smart HP Wand. Programmable, memory size from 128KB To 512KB. Can be used as memory card or stand alone as well.

RK DATA SYSTEMS
60-2450 Hawthorne Ave Pt Coquitlam BC V3C6B3
Tel(604)944-6033 Fax(604)944-6033 CANADA

CIRCLE 658 ON READER SERVICE CARD

[illegible]/BUSINESS APPLICATION

David's Software Sales
1-800-Floppy 3
1,000's of Software Titles
Dos-Windows-Mac-OS/2
Business-Entertainment-Educational-Utilities
Visa - Mastercard - Amex

Housman Enterprises
P.O. Box 6900 Reno, NV 89513-6900
Phone:702 746-1907 Fax:702-746-1909

CIRCLE 657 ON READER SERVICE CARD

UPS Shipping Software
Works stand-alone or w/ your acctg SW (DacEasy, Peachtree, Macola, Great Plains RealWorld etc.). Calculates zone & charges. Prints Manifest, COD tags, shipping labels. Optional carriers and scale intf. Guaranteed UPS acceptance. 60-Day MBG.

V-Technologies, LLC
P.O. Box 6261, Wolcott, CT 06716
(800) 462-4016 Fax: (203) 879-6962

CIRCLE 658 ON READER SERVICE CARD

BUSINESS UTILITIES

PRINT SCREEN FOR WINDOWS
MS Windows utility that prints the screen when the <Print Screen> key is pressed. Press the <Alt> + <Print Screen> key to print the current window. $19.95 per copy.
Site Licenses Available! P.O.'s Welcome!

AMERICAN SYSTEMS
7016 Thomas Pl Fort Worth, TX 76148
(817) 485-6547 Fax: (817) 485-2193

CIRCLE 659 ON READER SERVICE CARD

CD-ROM TITLES

CDROMS!CDROMS!CDROMS!
WE OFFER THE BEST IN CD-ROM TITLES OF ALL TYPES-GAMES, PRODUCTIVITY, EDUCATIONAL, AND ADULT. WE ALSO OFFER A CD PREVIEW PROGRAM, AND SHAREWARE SW ON DISKETTE. CONTACT US FOR FREE LISTS. JOIN THE CD-ROM REVOLUTION!

CLEARLIGHT SOFTWARE
DEPT. PCM, P.O BOX 1411, MILWAUKEE, WI 53201 (VOICE/FAX) (414) 962-2616

CIRCLE 660 ON READER SERVICE CARD

Email & Groupware CD-ROM Sampler
A multimedia tool that provides in-depth analysis from industry experts, FREE Software, vendor directories, presentations, video clips from industry leaders, case studies and more! Learn the latest products and issues! $99 V/MC

CREATIVE NETWORKS, INC.
480 Lytton Ave., Ste. 6, Palo Alto, CA 94301
415-326-9926 F: 415-326-4014

CIRCLE 661 ON READER SERVICE CARD

GREAT TITLES - FREE CATALOG
Looking for those fantastic new CD-ROM's? We have the best! Why wait any longer? Call, write, or FAX today for your **FREE** DataBarrys CD-ROM catalog. (CIS: 74407, 3420)

DataBarrys
3972 Barranca Pkwy, Suite 640, Irvine, CA 92714
800-530-2580 FAX: 714-651-0395

CIRCLE 662 ON READER SERVICE CARD

COMMUNICATIONS

Fax Directly From Windows Apps
FFWIN and the FaxFacts software solution team up to provide hands-free faxing and high volume broadcasting from any Windows app. Unlimited # local/global phonebooks permitted. FFWIN is network based; 100% user configurable.

COPIA INTERNATIONAL, LTD.
Wheaton, IL 60187 800-689-8898
Demo: 708-9243030 Request: 889829

Share Modems & Phone Lines!
Modem Assist PLUS is a full featured, non-dedicated modem server for IPX or NetBIOS networks. Use ANY Windows fax or commun. sw or DOS programs which support INT 14 or NASI. $999 unlimited ports, $799- 8ports, $499- 4ports, $299- 2 ports.

SYNERGY SOLUTIONS, INC.
2150 South Country Club, Ste. 1, Mesa, AZ 85210

CIRCLE 664 ON READER SERVICE CARD

Create Voice/FAX/BBS/Dbase Apps
Create stunning multi-line BBS, voice, fax apps using DAX! Dbase/Paradox. Royalty-Free runtime avail! PC/MAC versions-Editor's Choice Award. Call for starter kit now! Script-based; Comm. knowledge NOT required!

Ram Research
1920 Monument Blvd. Concord CA 94520
510-603-1122 510-603-1125

CIRCLE 666 ON READER SERVICE CARD

PC BUSINESSCARD

DATA BASE

dBASE file access from C, Basic...
CodeBase gives complete database management with multi-user dBASE, FoxPro or Clipper file compatibility from C, C++, Basic or Pascal. *Report Writer* and *Data Entry* software is included. Full 60-day money back guarantee.

SEQUITER SOFTWARE INC.
PO BOX 575 New Market, NH 03857-0575
Call (403) 437-2410, Fax (403) 436-2999

CIRCLE 666 ON READER SERVICE CARD

High-speed dBASE files in Windows?
You bet! Our ROCK-solid Engine Technology (ROCK-E-T) offers Windows developers (VB, VC++, Delphi, etc.) the fastest multi-user access to .DBF files & Clipper, FoxPro & HiPer-Six indexes & memos. Browser & Data Controls (VBX) incl. Sgl-user $149.

SUCCESSWARE INTERNATIONAL
27349 Jefferson Ave, Temecula, CA 92590
800-683-1657/909-699-9657/Fax:909-695-5679

CIRCLE 667 ON READER SERVICE CARD

DATA ENTRY

The Data Entry Emulator™
Full featured, heads-down data entry with two-pass verification, edit language, operator stats, batch control, output record reformat, on-line help, free tech support. From $395. LAN version available.

Computer Keyes
21929 Makah Road, Woodway, WA 98020
800-356-0203/206-776-6443/Fax:206-776-7210

FINANCIAL/ACCOUNTING

Easy Direct Deposit™ for Windows
The leader in Direct Deposit now offers stand-alone modules for Windows versions of QuickPay™, MYOB™, Peachtree®, Simply Accounting™, One Write Plus®, and DacEasy®. Call National Payment before 6/30/95 for 60 day free trial. Code # 1103

National Payment Corporation
100 W. Kennedy Blvd. Ste. 260 Tampa, FL 33602
Tel. 800-284-0113 Fax. 813-221-8651

CIRCLE 669 ON READER SERVICE CARD

FOREIGN LANGUAGES/FONTS/TRANSLATIONS

LEADER IN FOREIGN LANGUAGE
WE SET THE STANDARD. Over 100 languages $25 & up. Translators, tutorials, fonts, spell checkers & related software. Japanese, Chinese, Spanish speaking staff. Call for samples/prices. **FREE** interactive catalog. LOWEST PRICES GUARANTEED.

CHARACTER LANGUAGE RESOURCE
2130 Sawtelle Blvd.#304A, Los Angeles,CA 90025
800-569-2099/310-996-2300/FAX 310-996-2303

CIRCLE 670 ON READER SERVICE CARD

MARKETING POWER
Is yours when you place your message in this space. Reach 1,044,227 buyers of all kinds of PC products. Give your business card PC Magazine Marketplace Power.

BusinessCard
Call 1-800-825-4237 today.

MAILING LIST MANAGEMENT

Mail Order Manager (™)
America's favorite integrated solution for mail/phone order business - order entry, credit card processing, UPS manifest, accounting, telemkt'g, mailing list mgmt & more! Single & Multi-user systems starting at $1195. Working Demo $25 (Ref)

Dydacomp Development Corp.
150 River Road, Ste N1 Dept.PCM, Montville, NJ 07045 Tel:800-858-DMOM or 201-335-1256

CIRCLE 672 ON READER SERVICE CARD

MANUFACTURING/INVENTORY

INVENTORY MANAGEMENT
Stock-Master 4.0, com. grade system, has Stock Status Rptg, PO Write & Track, Trend Analysis, QC Rptg, Trans Hist Detail Analysis, Multi Loc support, BOM, Matl Req Planning, Serial/Lot No Track, Quote/Ord/Inv Prep.

Applied Micro Business Systems, Inc.
177F Riverside Ave., Newport Beach, CA 92663
714-759-0582

CIRCLE 673 ON READER SERVICE CARD

MAINTENANCE MANAGEMENT
PC-based system for the small to medium size business. FEATURES: Work Orders (space for detail instructions & safe work procedures), equipment descriptions, historical data, operating & analytical reports, inventory. Write for free Demo!!

PENGUIN COMPUTER CONSULTANTS
P.O Box 20485, San Jose, CA 95160
800-521-0545 (408)997-7703 Fax (408)927-0570

CIRCLE 674 ON READER SERVICE CARD

MAINTENANCE TRACKER ™
The best software for any size plant or factory. Instruments, Mechanical, Electrical equipment, PM scheduling, Equipment Data & History, Work Orders, Parts Inventory, Tech Manual library. Easy search, report filtering. Network capable!

TRISKA TECHNOLOGIES
Call for **FREE DEMO** and more information.
Voice/FAX (503) 630-5222

E-Z-MRP™ Manufacturing Software
Complete manufacturing software for material requirements planning. Includes bill of materials, MRP, capacity requirements, purchase orders, labor distribution, physical inventory, AutoCAD™ interface, and more. No-risk trial. Call for free info.

Alliance Manufacturing Software
4901 Morena Blvd, Ste 122, San Diego, CA 92117
(800) 490-2520 voice (619) 490-9292 fax

CIRCLE 676 ON READER SERVICE CARD

Hand Your Business Card...
To 1,044,227 of the most qualified buyers in the PC market. These brand-specifiers are looking to buy while reading the industry's #1 publication. There is no more cost-effective or efficient way for you to build sales.

BusinessCard
Call your BusinessCard representative today.
1-800-825-4237

MEDICAL/DENTAL

Lytec Medical/Dental
Advanced practice mgmt for DOS & Win. Patient & insurance billing, accts receivable, electronic claims, practice mgmt, prsnl info mgmt, prsnl fin., sched., graphics, laser forms, multi-user, multi-provider & more. 60 day money back guarantee.

Lytec Systems, Inc.
7050 Union Park Center, Suite 390 Midvale, UT 84047 Tel: 1-800-735-1991

CIRCLE 678 ON READER SERVICE CARD

PRACTICE BILLING
MD VersaForm, easy, ledger-based design. Managed care support. No per-claim charge ECS for Medicare/Medicaid/DME. Customizable reports, screens & files. LAN support. From $1,295. Free lit/demo. Dealers wanted.

Applied Software Technology
591 W. Hamilton Ave., Ste. 201, Dept.99
Campbell, CA 95008 (800)678-1111 Ext. 99

MD / PT / DC / DDS / Specialists
- EClaims for Windows $99 • Billing Mgr $489
- Office TimeClock $195 • Office Mgr $995
- Nutrition/Stress Eval $189 • Practice Mgr $1895
- E-Voice Notes & Practice Mgmt Integration - Call

MBA Inc - Healthware™ Since 1983
2047 Old Middlefield, Mt View CA 94043
(800) 456-2622 FAX (415) 967-3404

CIRCLE 680 ON READER SERVICE CARD

PROGRAMMING TOOLS

Visual Basic Programming Tools
Add-on tools for VB, VB_DOS, QuickBASIC and PDS, all with tutorials and full source. Custom controls, DLL's, general purpose toolboxes, assembly routines, graphics, screen design, TSR's and much more. No royalties. Free demo & catalog.

CRESCENT SOFTWARE, INC.
11 Bailey Avenue, Ridgefield, CT 06877-4505
1-800-35BASIC 203-438-5300 Fax:203-431-4626

Delphi tools...native VCLs
Orpheus is a collection of data entry components. Validated fields, virtual listbox, Win'95 style tabs. Async Professional for Windows has complete async tools for Delphi. Don't hassle with VBXs. VCLs scale to 32 bit Windows. Call for FREE info.

TurboPower Software Co.
P.O. Box 49009 Colorado Springs,CO 80949-9009
(800) 333 4160, FAX (719) 260-7151

We Want To Publish Your Software!
Looking for cooperative relationships w/quality sw developers who want to profit from their efforts! Our marketing expertise, winning track record and your sw can create another sw industry success! All calls confidential & your ideas will be protected.

AllMicro, Inc.
18820 US Hwy 19N,Ste 215,Clearwater,FL 34624
800-653-4933 ask for Mr. Kaplan,FB13-531-0200

CIRCLE 683 ON READER SERVICE CARD

PC BUSINESSCARD

RELIGION

CHURCH MANAGEMENT SOFTWARE
PowerChurch Plus for Windows is making church management easy for over 40 denominations. Membership records, contributions, full fund accounting, network support and much more. Call today for FREE INFO in the mail.

F1 SOFTWARE
208 Ridgefield Drive, Asheville NC 28806
(800) 486-1800. FAX (704) 665-1999.

CIRCLE 684 ON READER SERVICE CARD

Bible Study Software
For 10 years we have remained the leading Bible study software company. Think of us as a Bible bookstore with an integrated family of software products for your Bible study needs! Call for a FREE catalog!

Bible Research Systems
2013 Wells Branch Pkwy. #304 Austin, TX 78728
1-800-423-1228 1-512-251-7541

SCIENTIFIC/ENGINEERING

EXPERIMENTAL DATA FITTING
SCIENTIST, now on Windows, fits experimental data to any combination of user-defined algebraic and differential equations, and Laplace transforms—also determines best fitting splines, polynomials and interpolating functions.

MicroMath Scientific Software
Box 21550, Salt Lake City, UT 84121-0550
1-800-942-6284 Fax (801) 943-0299

CIRCLE 686 ON READER SERVICE CARD

STATISTICAL/RESEARCH

New Version 5.0
Analyzes marketing, public opinion, customer satisfaction, employee attitude surveys. Handles mail, personal, phone, scanner, disk-by-mail or computer interviews. Records verbatim text & voice answers. Spell checks answers. User friendly. Free newsletter & support.

Creative Research Systems
140 Vista View #100, Petaluma, CA 94952-4728
Ph.(707)765-1001/Fax (707)765-1068

CIRCLE 687 ON READER SERVICE CARD

NCSS 5.x Series - $125
"Best value & easiest to learn/use" PC Week. Menus/Spreadsheet. Means, etc. Regression, t tests. ANOVA Factor, cluster & discriminant. Cross tabs. Nonparametrics. Histograms. Plots. Reads ASCII/Lotus. Many extra modules.

NCSS
329 North 1000 East, Kaysville, UT 84037
Phone: 801 546-0445 FAX: 801 546-3907

CIRCLE 688 ON READER SERVICE CARD

#1 in Surveys - StatPac Gold IV
Professional's choice for survey & marketing research. User friendly, comprehensive & dependable. Camera ready tables & graphics. Basic & advanced statistics. CRT & telephone interviewing. Easiest to learn. Guaranteed.

StatPac Inc.
4532 France Ave. S., Minneapolis, MN 55410
Tel: (612) 925-0159 Fax: (612) 925-0851

CIRCLE 689 ON READER SERVICE CARD

SERVICES/COMPUTER INSURANCE

Insures Your Computer
The COMPUTEROWNERS™ insurance policy repairs or replaces hardware, media and purchased software. Rates as low as $49 a year covers theft, fire, accidents, power surge and more! Call for immediate coverage or info. 1-800-800-1492

Safeware, The Insurance Agency Inc.
2929 N. High St., PO Box 02211, Columbus, Ohio 43202 1-800-SAFEWARE

CIRCLE 690 ON READER SERVICE CARD

DATA CONVERSION/DATA RECOVERY

TAPE CONVERSION & DUPLICATION
ALL TAPE TYPES (1/4", TEAC, 4mm DAT, 8mm EXABYTE, DEC TKxx, 1/2", 3480, 3490) & All Formats (MICRO, NETWORK, UNIX, MINI & MAINFRAME) - Very Fast Turnaround & Realistic Pricing. Full Service for Data Recovery including Overwrites.

VOGON
USA 405-321-2585 Fax: 405-321-2741
UK 44+(0)1734-890042 Fax: 44+(0)1734-890040

CIRCLE 691 ON READER SERVICE CARD

SOFTWARE DUPLICATION

TRIM YOUR COPY TIME...
And get your software produced fast. For CDs, diskettes and tapes, rely on KDM duplication, documentation and distribution services. Isn't it time to put some time back into your schedule? Call for free consultation.

KDM Associates, INC.
20W 345-D 101st St., Lemont, IL 60439
1-800/538-6160 Ext 214

CIRCLE 693 ON READER SERVICE CARD

TRAINING/TUTORIAL

PC AND LAN TRAINING
Onsite and Public Seminars Nationwide
PC Troubleshooting, Maintenance & Upgrading
Managing PC Software
Configuring PCs & Optimizing Performance
Understanding & Using LANs

CORNERSTONE TRAINING CORP.
5 Jillian Court, Spotswood, NJ 08884
908-251-6300 908-251-6366 FAX

CIRCLE 696 ON READER SERVICE CARD

Throw Out the Manuals
Video's the easy way to learn. Save by renting. A two week rental, including S&H, costs about a dollar a day. Over 90 different titles for Windows, DOS, Excel, Word, WordPerfect, PageMaker, Lotus, etc. Get a free catalog. Ask about CD ROM rentals.

CareerTAPES® Enterprises
PO Box 309, Center Harbor, NH 03226
(603) 253-7470

CIRCLE 697 ON READER SERVICE CARD

MISC./BOOKS/CATALOGUES

COMPUTER BOOKS ONLINE
Easy online ordering at our Internet, CompuServe, & NIFTYServe stores. 15% off most books from 140 publishers for computer professionals. GO CBK, www.compubooks.com/books.html, or ftp info.txt from ftp.compubooks.com. Worldwide shp.

CompuBooks
RR 1 BOX 271D, Cedar Creek TX 78612 USA
512-321-9652 FAX321-4525 Orders800-880-6818

CIRCLE 698 ON READER SERVICE CARD

88% OF PC MAGAZINE SUBSCRIBERS PURCHASED COMPUTER PRODUCTS DIRECT IN THE PAST 12 MONTHS ...

	% OF SUBSCRIBERS
Software	79%
Peripherals	61%
Supplies	57%
Computers	48%
Networking Products	14%

Sell your products direct here, call your Marketplace account representative today at 800-825-4237

PC MARKETPLACE

PC MAGAZINE

SUBSCRIPTION SALE

Answers. Advice. Strategies. Solutions.
22 times a year, you get it all from PC MAGAZINE.

To receive your lowest possible rate, call toll free:

1-800-289-0429

BONUS:
Free Home or Office Delivery

Please mention code 4Z94 to our operator.

THOUSANDS OF PRODUCTS AT GREAT PRICES!

MODEMS

U.S. Robotics

Sportster 14.4/14.4 Internal Modem MBUSR3276 **$99**

U.S. Robotics

Sportster 14.4/14.4 Int. Faxmodem	$99
Sportster/Courier 28.8/14.4 Ext. Faxmodem	245/429
Sportster/Courier 28.8/14.4 Int. Faxmodem	225/519

MOTOROLA

Fastalk II 14.4/14.4 Ext. Faxmodem	$119
Fastalk II 14.4/14.4 Int. Faxmodem	99
Cellect 14.4 Cellular Pocket Modem	299

UPS

APC

Back-UPS 280	$99
Smart UPS 250	215
Backup-UPS/Smart UPS 400	139/265
Backup-UPS Pro/Smart UPS 420 w/Powerchute	209
Backup-UPS/Smart UPS 600	239/325
Backup-UPS/Smart UPS 650 w/Powerchute	279
Backup-UPS/Smart UPS 900	339/469
Backup-UPS/Smart UPS 1250	439/579
Backup-UPS Pro 280 V/A	139
Backup-UPS Pro 420 V/A	219
Backup-UPS Pro 650 V/A	279

MONITORS

CTX

15", .28, 1024 x 768, N.I. CM1565GM	$319
17", .28, 1280x1024, N.I. CM1769GM	649

MAGNAVOX Smart.Very smart.

15" Monitor
.28 dot pitch, 1024x768 resolution, Non-interlaced
CMMA2015 **$289**

MAGNAVOX Smart.Very smart.

15", .28, 1280x1024, N.I. CMMA4015	$349
17", .31, 1024x768, N.I. CMMA4017	639
20", .31, 1280x1024, N.I. CMMA20CM64	999

mag

15", .28, 1280x1024, N.I. CMDX15F-1	$319
17", .28, 1280x1024, N.I. CMDX17	619
21", .28, 1600x1200, N.I. CMDX21F	1,899

SONY

15" MultiScan 15SF, .25, 1280x1024 CM5E15SF1	$439
17" MultiScan17SE1, .25, 1600x1200 CM17SE1	959
20" MultiScan 20SE, .30, 1600x1200 CM5E20SE1	1,899

MEMORY

Only $31/MB

PNY The Memory Leader Worldwide

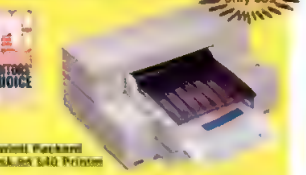
16MB Memory Module
w/installation video
4 x 32
PY4X32-70 **$499**

Call for all other memory products and prices!

PRINTERS

HEWLETT PACKARD

Color option only $39



Hewlett Packard DeskJet 540 Printer

Incredible high quality 600x300 dpi printer at an amazingly low price
HPDJ540 **$289**

HEWLETT PACKARD

HP LaserJet 4L 4 ppm Laser 300 dpi 1MB	$509
HP LaserJet 5P 600 DPI Laser 6ppm 2MB	849
HP DeskJet 320 Portable Ink Jet 600 dpi 3ppm	299
HP DeskJet 540 Ink Jet 600 dpi 3ppm	289
HP DeskJet 1200CS 600 dpi 7ppm 2MB	979
HP DeskJet 1200PS 600 dpi 7ppm 4MB	1,579

OKIDATA

ML380 Dot Matrix 24-pin 192 CPS	$215
ML 590 Dot Matrix 24-pin 360 CPS	425
OL400E LED 4ppm 512k	409
OL410E LED 4ppm 2MB	539
OL810 LED 8ppm 2MB	909
OL850 LED 8ppm 2MB	1,239

TEXAS INSTRUMENTS

MicroWriter LED 5ppm 512K	$469
MicroWriter PS23 LED 5ppm 2MB	619
MicroLaser Pro E 12ppm 3MB	1,349
MicroLaser Pro 600 PS23	1,179
MicroLaser Power Pro 12ppm 6MB	1,479*

Canon

BJ-10SX Portable Bubble Jet 360 dpi 110 CPS	$249
BJ-200EX Bubble Jet 720 dpi 248 CPS	235
BJC-4000 Color Bubble Jet 720 dpi 446 CPS	355
BJC-600E Color Bubble Jet 720 dpi 240 CPS	469
LBP 1260-Laser 12ppm 2MB	1,289

EPSON

LQ-300 Dot Matrix 24-pin 240 CPS	$199
LQ-570+ Dot Matrix 24-pin 225 CPS	249
Stylus 600+ Inkjet 360 dpi 250 CPS	219
Stylus 1000 Inkjet wide carriage 360 dpi	449
Stylus Color Inkjet 720 dpi 200 CPS	509
Action Laser 1100 4ppm 1MB	389
Action Laser 1600 6ppm 2MB	779

PROPHONE

Select Phone
- Phonebook on CD-ROM
- U.S. white & yellow pages
- Unlimited downloading
- Unrestricted access

213936 **$149**

IDE HARD DRIVES

WESTERN DIGITAL

1280MB
- 10ms
- 3.5" 1"H
- 128k cache
- 4,500 RPM
- Enhanced IDE

WD31200A **$399**

SCSI HARD DRIVES

Seagate BARRACUDA

4294MB
- 8ms
- 3.5" HH
- 1,024k cache
- 7,200 RPM
- Fast SCSI-2

ST15150N **$1,599**

HARD DRIVES

The Mass Storage Experts.

WESTERN DIGITAL

Capacity*	Interface	Model	Access	FF/Height	Bare
540MB	IDE	WD2540A	11ms	3.5" 1"H	$209
730MB	IDE	WD2700A	10ms	3.5" 1"H	255
850MB	IDE	WD2850A	10ms	3.5" 1"H	275
1080MB	IDE	WD3100A	10ms	3.5" 1"H	385
1280MB	IDE	WD31200A	10ms	3.5" 1"H	399

CONNER

425MB	IDE	CFS425A	14ms	3.5" 1"H	$185
541MB	IDE	CFA540A	14ms	3.5" 1"H	205
850MB	IDE	CFA850A	10ms	3.5" 1"H	289
1275MB	IDE	CFA1275A	10ms	3.5" 1"H	399

Maxtor

425MB	IDE	MX7425AV	12ms	3.5" 1"H	$195
540MB	IDE	MX7540AV	12ms	3.5" 1"H	209
850MB	IDE	MX7850AV	12ms	3.5" 1"H	279
1260MB	IDE	MX71260AV	12ms	3.5" 1"H	419

Quantum

420MB	IDE	QULT420A	12ms	3.5" 1"H	$189
540MB	IDE	QULT540A	11ms	3.5" 1"H	235
730MB	IDE	QULP730A	11ms	3.5" 1"H	259

Seagate

341MB	IDE	ST9385AG	16ms	2.5" 19mm	$279
524MB	IDE	ST9655AG	16ms	2.5" 19mm	419
420MB	IDE	ST3491A	13ms	3.5" 1"H	175
545MB	IDE	ST3660A	14ms	3.5" 1"H	179
722MB	IDE	ST3780A	12ms	3.5" 1"H	249
850MB	IDE	ST5850A	12ms	3.5" 75"H	265
1083MB	IDE	ST31220A	12ms	3.5" 1"H	375

MICROPOLIS

Capacity*	Interface	Model	Access	FF/Height	Bare
2100MB	SCSI	MC4221S	8.5ms	3.5" 1"H	[illegible]
2100MB	SCSI	MC4221AV	8.5ms	3.5" 1"H	1,059
4300MB	SCSI	MC3243S	8.5ms	3.5" HH	[illegible]
4300MB	SCSI	MC3243AV	8.5ms	3.5" HH	[illegible]
9100MB	SCSI	MC1991	12ms	5.25" FH	[illegible]
9100MB	SCSI	MC1991AV	12ms	5.25" FH	[illegible]

CONNER

1060MB	SCSI	CFP1060S	10ms	3.5" 1"H	$509
2147MB	SCSI	CFP2105S	8.5ms	3.5" 1"H	825
2147MB	SCSI	CFP2107S	8.5ms	3.5" 1"H	999
4294MB	SCSI	CFP4207S	9ms	3.5" HH	1,619

Quantum

365MB	SCSI	QULT365S	11ms	3.5" 1"H	$195
540MB	SCSI	QULT540S	11ms	3.5" 1"H	255
730MB	SCSI	QULT730S	11ms	3.5" 1"H	289
1080MB	SCSI	QUEM1080S	9.5ms	3.5" 1"H	539
1440MB	SCSI	QUEM1440S	9.5ms	3.5" 1"H	725
2150MB	SCSI	QUEM2150S	8ms	3.5" 1"H	969
4280MB	SCSI	QUGP4280S	8.5ms	3.5" HH	1,549

Seagate

545MB	SCSI	ST5660N	12ms	3.5" .75"H	$299
1050MB	SCSI**	ST31250N	8ms	3.5" 1"H	699
1052MB	SCSI	ST31230N	9ms	3.5" 1"H	499
2100MB	SCSI	ST32430N	9ms	3.5" 1"H	899
2145MB	SCSI**	ST32550N	8ms	3.5" 1"H	959
4294MB	SCSI**	ST11510N	8ms	3.5" HH	1,599
4294MB	SCSI	ST11230N	9ms	3.5" HH	1,399
9080MB	SCSI	ST41080DN	11ms	5.25" FH	2,999

bytes **Barracuda Drives

DOOM II: Hell on Earth

In the annals of computer entertainment, there's no game that had the rave following quite like DOOM. There's also no game that's quite as breathlessly awaited as its sequel

214223 **$45**

TurboTax

Using TurboTax is the easiest, fastest and most reliable way to prepare a tax return. For Windows.

214578 **$45**

CD-ROM DRIVES

TEAC

CD55 Superquad 4x CD-ROM w/controller $259

PLEXTOR

4-Plex Internal w/256K Cache	$339
6-Plex Internal w/256k Cache	599

TOSHIBA

Model 3501
Internal Quad Drive, Bare .. 359 16 bit kit ... 419

Talon

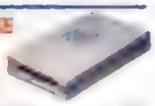
Internal Quad Drive w/16 bit sound card	$249
Bare Drive Kit	199

Mountain

CD7 Double Speed 7 CD Minichanger	$479
Sidecar 4x Parallel Port CD Drive	399

REMOVABLE STORAGE

FUJITSU



Fujitsu Int MO 230MB (PC) w/2 Cart	$699
Fujitsu DynaMO 230 (Mac) w/1 Cart	699
Fujitsu DynaMO 230 (PC) w/1 Cart	749

TAPE BACKUPS

COLORADO MEMORY SYSTEMS

250MB Internal Tape Backup	$159
350MB Tape Backup Internal	169
Trakker 250MB External Parallel	289
Trakker 700MB External Parallel	459

CONNER

TapeStor 420MB Internal Tape Backup	$179
TapeStor 850MB Tape Backup	289

MEGA

Ditto 420MB Internal Backup	$179
Ditto 850MB Internal Backup	249
Ditto 420MB External Parallel Port Backup	299

Talon 250MB

Internal w/2 unformatted tapes TBTA250IK	$149
Internal w/5 formatted tapes TBTA250IK5	179
External Parallel Port TBTAJT2D	299

WangDAT

4mm DAT 2GB Int. 16 Bit Kit	$899
4mm DAT 4GB 3200 Int. 16 Bit Kit	1,049
4mm DAT 4GB 3200 Ext 16 Bit Kit	1,199
4mm DAT 8GB 3400 Int. 16 Bit Kit	1,199

SOFTWARE

Best-Selling CD Titles

Corel Gallery	$36
Direct Phone	79
MS Ancient Lands MPC	49
MS Bookshelf	59
MS Encarta MPC	79
MS Golf MPC	39
Delorme Global Explorer Win.	49
Delorme Map Expert 2.0 Win.	239
Just Grandma & Me MPC	35
MYST MPC	49
Print Shop Ensemble	75
Select Phone	149
Small Blue Planet Windows	39
Street Atlas MPC	69

Microsoft & Lotus Upgrades

MS DOS 6.22 Upgrade	$49
MS FoxPro 2.6 Professional Upgrade	259
MS Win for Workgroups 3.11 Upgrade	45
MS Project 4.0 for Windows Upgrade	129
MS Win NT Workstation Upgrade 3.5	99
Lotus 1-2-3 5.0 for Win. Upgrade	79
Lotus AmiPro 3.1	99
Lotus Organizer 2.0 Upgrade	35

FREE Insight Catalog.

Thousands of products at great prices.

Prices and availability are subject to change without notice. All trademarks and trade names are the property of their respective owners. The Insight 24 hour guarantee applies to most items sold and delivered within the 48 contiguous states. Some manufacturers' warranties require you to register your product with them. Insight will be happy to help you with this. Some manufacturers' products are subject to restrictions by the U.S. Government. Insight reserves the right to refuse to sell to resellers. Some manufacturers' products are not available for sale to certain countries. Insight will be happy to inform you about these restrictions

A Pentium for Every Home

With multimedia capabilities and Pentium CPUs, these nine PCs prove that in 1995, home is where the hardware action is heading.

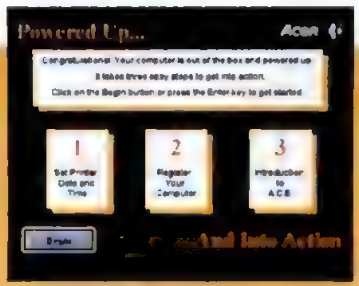
By Alice Hill

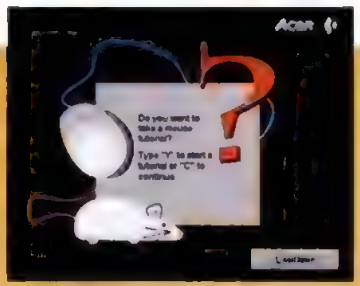
Does the term *home PC* still have you thinking of scaled-down, underperforming office throwaways? Then it's time to look again. In 1995, home is where the hardware action is heading. The nine systems we found with street prices under $2,500 probably outmuscle what you're running at work, and they add multimedia capabilities for good measure.

What makes or breaks a good home system is sheer ability. The more you can do with your computer—the more it can change, from letter writer to tax accountant to teacher—the more

Illustration by Jack Harris/Visual Logic

T-OF-BOX EXPERIENCE





A·C·E
THE ACER COMPUTER EXPLORER

A.C.E., the Acer Computer Explorer, is another integral part of OOBE. It's a unique menuing system that works with Microsoft® Windows™ to make Acer computers even easier to use.

When you first start up your new Acer PC, you'll be greeted with a quick tour that covers everything from using the mouse to sending in your registration online. A.C.E. then provides an easy-to-understand interface that lets you quickly get to your programs and important reference information. No hide-and-seek with confusing icons and directories. Just an easier way to use a PC.

personal computers the world's easiest to use.

Acer®

The Industry Source Means Value.

Acer and the Acer logo are registered trademarks and OOBE is a trademark of Acer America Corporation and Acer Inc. All other products, brands or company names are trademarks or registered trademarks of their respective companies.
©1995 Acer America Corporation. All rights reserved.

CIRCLE 273 ON READER SERVICE CARD

Inverted Back

1. Follow instructions on the other side

GbsFlipBack-001B

Back

1. Follow instructions on the other side

Inverted Foldout slip-sheet

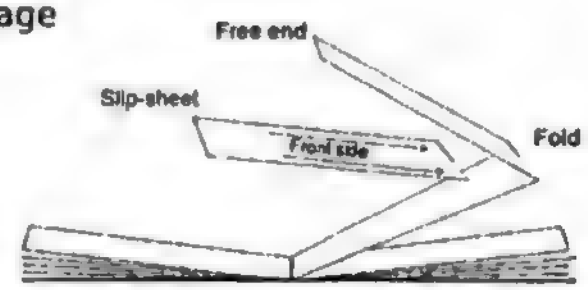
1. Open the foldout page
2. Insert this sheet with
   1. Front side touching the free page
   2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

Folded edge of the page

GbsSlipSheet-001

Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
   1. Front side touching the free page
   2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Acer

OOBE: Ou

OOBE™ (rhymes with ruby) stands for Out-Of-Box Experience. New from Acer, OOBE makes setting up a personal computer faster and easier than you ever imagined. All the parts and materials are clearly labeled and packaged, so assembly is as easy as 1-2-3. A large poster with full-color photos walks you through each step. And there's a toll-free hotline to call if you have any questions.

No confusing jargon.
No technical double-talk.
Just a fast and easy setup.

OOBE and A.C.E. make Acer

ACER COMPUTERS • THE INDUSTRY SOURCE •

Call 1-800-371-ACER
for the Acer retailer nearest you.

What is

It's going to change how people use computers.

I can't believe no one thought of it sooner.

OOBE?

(o͞o´bē)

IN THIS REVIEW

AcerAcros Pentium Minitower.....394
AST Advantage! Adventure 6075p.....395
Gateway 2000 P5-75 Family PC.....402
IBM Aptiva 730.....402
Leading Edge Fortiva Series 5000.....405
Micron P90 Home MPC.....408
NEC Ready 9510.....410
Packard Bell Multimedia Pentium.....411
USA Flex PT-75 MultiMedia Classic.....416
Software-Compatibility Tests.....393
Performance Tests.....400
The Macintosh Option.....405

useful it is. In short, a good home PC must offer solid hardware paired with useful software, all ready to run straight out of the box.

The nine systems we gathered for this story are true home PCs. They offer documentation you can digest, powerful features, and capabilities ranging from voice mail answering systems to high-speed modems to software for every member of the family. They also offer something for both the seasoned computer user and the novice: easy access via innovative Windows front ends and tutorials, and just plain Windows for those who know their way around a system.

REVIEW CRITERIA

To be included in this roundup, products needed to be Pentium-class systems configured for home multimedia use with a double-speed CD-ROM drive (or faster), a 16-bit sound board, speakers, and bundled software. We set a street-price ceiling of $2,500 (the list price could be higher), which included a system configured with 8MB RAM, a 400MB hard disk (or larger), a 14.4-Kbps fax modem, a 14-inch color monitor (or larger), a mouse, and a keyboard. The systems also had to be specifically targeted at the home market.

In addition to the nine vendors that sent in systems, several others were polled. Compaq did not have a Pentium-based version of its popular Presario ready in time for this roundup, and AT&T was in the middle of revamping its home line. New offerings from both companies should be available shortly.

The systems we did include all offer considerably more than our minimum requirements. The smallest hard disk in the roundup came in at 514MB; three of the systems offer more than 1GB of hard disk space. Two of the systems (the IBM Aptiva 730 and the Leading Edge Fortiva Series 5000) are driven by 60-MHz Pentium CPUs, two systems are based on 90-MHz Pentiums (the Micron P90 Home MPC and NEC Ready 9510), and

OUT-OF-BOX SOFTWARE-COMPATIBILITY TESTS

To evaluate the systems' abilities to run the types of software typically used in homes, we performed application-specific compatibility tests. Only two of the systems (the Leading Edge Fortiva Series 5000 and the Packard Bell Multimedia Pentium) were able to run all of the applications in our test suite successfully.

OS/2 proved to be the most problematic of the applications. OS/2's device driver does not support the Mitsumi CD-ROM drive used by both the AcerAcros Pentium Minitower and the NEC Ready 9510, nor the AMI BIOS used by the USA Flex PT-75 MultiMedia Classic. The Gateway 2000 P5-75 Family PC produced an error message that suggested we either upgrade the system or contact a service representative. The AcerAcros, the Gateway P5-75, and the Micron P90 Home MPC all had difficulty locating a necessary QuickTime for Windows DLL when attempting to run Myst, because a newer version of QuickTime had been installed by another application. The IBM Aptiva 730 ran into sound and video problems on the Magic School Bus test, and the USA Flex PT-75 periodically hung on exiting that program. Because of a faulty SmartDrive setting, the USA Flex PT-75 also had difficulty running DOOM II. The AST Advantage! Adventure 6075p, meanwhile, experienced shifts in the Windows color palette when exiting Star Trek.

THE APPLICATIONS The software compatibility tests called for a system to be able to load and run the following applications successfully: DOOM II (GT Interactive Software); The Magic School Bus Explores the Human Body (Microsoft Corp.); Myst (Broderbund Software); OS/2 Warp, Version 3 (IBM Corp.); the PC Magazine CD (Ziff-Davis Publishing Co.); and The Star Trek Interactive Technical Manual (Simon & Schuster Interactive).

WHAT THE GRADES MEAN We have given the systems letter grades for each of the application-compatibility tests. An A means that a system loaded the software and was able to run many basic functions within the package successfully. We awarded a grade of B to a system that successfully ran an application after we first encountered some minor, easily remedied problems. If a system was able to load an application but encountered intermittent lockups or crashes when attempting to run the program, it received a grade of C. Systems earning D grades encountered major difficulties with sound, video, or other subsystems that could not be easily resolved. A system that could neither load nor run an application received a failing grade of E.

Grades range from A—complete software compatibility—to E—complete incompatibility.	DOOM II	Magic School Bus	Myst	OS/2 Warp	PC Magazine CD	Star Trek
AcerAcros Pentium Minitower	A	A	D	E	A	A
AST Advantage! Adventure 6075p	A	A	A	A	A	B
Gateway 2000 P5-75 Family PC	A	A	D	E	A	A
IBM Aptiva 730	A	B	A	A	A	A
Leading Edge Fortiva Series 5000	A	A	A	A	A	A
Micron P90 Home MPC	A	A	D	A	A	A
NEC Ready 9510	A	A	A	E	A	A
Packard Bell Multimedia Pentium	A	A	A	A	A	A
USA Flex PT-75 MultiMedia Classic	B	D	B	E	A	A

the remaining five systems (the Acer-Acros Pentium Minitower, AST Advantage! Adventure 6075p, Gateway 2000 P5-75 Family PC, Packard Bell Multimedia Pentium, and USA Flex PT-75 MultiMedia Classic) all use 75-MHz Pentium chips. On our tests, the performance differences among the various chip types and systems proved to be small.

Multimedia itself has also taken a turn, or rather a spin, for the better. Five of the nine systems include quad-speed CD-ROM drives, and several include wavetable audio boards. And say goodbye to those tiny, tinny speakers shipped with most multimedia PCs. The home PCs in this review may not produce audiophile-level sound, but most boast larger, more powerful speakers.

You'll also hear a lot more phones ringing on home PCs this year. Six of these systems include telephony capabilities, including voice mail, speakerphones, and even voice recognition.

Of course, nothing says *home PC* like preloaded software. The bundled titles included with these systems provide a thoughtful mix of programs designed to appeal to an entire household. Five of the systems include a Windows front end, ranging from the Spartan "Your Software" directory structure of the IBM Aptiva 730 to the everything-in-a-folder approach of the AcerAcros Pentium Minitower's A.C.E. front end or the virtual living-room metaphor employed by Microsoft Bob and bundled with the Micron P90 Home MPC and the NEC Ready 9510. The Packard Bell Multimedia Pentium's 25-plus titles put it at the top of the list, but no system bundled fewer than 10 titles.

To make this bounty easier to set up and use, all the systems include some sort of setup guide. Many of the systems take easy setup even further by labeling ports and designing cases for quick access. Packard Bell provides the most help in this arena, by color-coding cables, labeling ports, and providing a poster that clearly delineates the setup process.

Micron P90 Home MPC

The nine machines in this roundup offer a superior mix of ease of use, processing power, and bundled software, but none provides as much to serve both novice and experienced home users as the Micron P90 Home MPC. This system combines high performance, expandability, and ease of use with a solid software bundle—all at a reasonable $2,599 list price. Since it also has a 90-MHz Pentium and an 812MB hard disk, you'll probably be in no rush to upgrade; but when the time is ripe, you'll find plenty of room.

The Micron P90 is no slouch when it comes to the out-of-box experience, either. Its quick-start setup guide clearly points out everything you need to know to get up and running in a hurry. The system should have no problem running your applications either. On our software-compatibility tests, it ran all the applications but Myst. To make the computing experience painless for even the most phobic of home PC users, the Micron P90 bundles Microsoft Bob, which combines a Windows front end with a series of applications to turn your desktop into a virtual home. Factor in Micron Computer's strong showing on our Service and Reliability survey—a top grade of A—and you have a system that's hard to beat.

The Packard Bell Multimedia Pentium earns honorable mention for going the extra mile toward user- friendliness. Its illustrated setup poster, color-coded ports and cables, and custom Windows front end make setting up and using the system as unintimidating as possible. Its 26 bundled software titles ensure that there's something for everyone.

HOW WE TESTED

To help make your buying decision easier, we put these machines through a rigorous set of tests. In addition to a suite of PC Magazine Labs performance tests, we performed a series of compatibility tests to see how well the systems could run some popular (though technically demanding) games and applications. We also performed subjective sound-quality tests to see how well the systems' sound cards and speakers could reproduce .WAV, MIDI, and analog audio files. Finally, we scored each of the systems according to seven criteria vital to home users: setup, bundled software, performance, sound, upgradability, service and reliability, and overall value.

So what is the essence of a home PC today? Think of it as raw capability wrapped in mature technology: a second-generation Pentium, a quad-speed CD-ROM, a higher-quality sound board, and a more powerful set of speakers. The ideal home PC is also an inviting system that guides the novice user, yet gives the power user room to expand. And it does all of this without breaking the bank. In short, home is where the best PC is.

Acer America Corp.

AcerAcros Pentium Minitower

What's the fastest way to distinguish yourself from the pack? Paint everything black. With an all-black color scheme that carries through to the mouse and speakers, Acer America Corp.'s $2,399 AcerAcros Pentium Minitower is definitely eye-catching. But looks aren't enough to ensure success, and this 75-MHz machine is often just a pretty face when it comes to performance.

Newcomers will appreciate the way Acer organizes manuals and documenta-

Our Contributors: ALICE HILL is a senior technical editor for *Computer Life*. HENRY NORR is editor emeritus of *MacWEEK*. GAYLE C. EHRENMAN was the associate editor in charge of this story, and WILLIAM P. FLANAGAN, a staff writer at *PC Magazine*, was the project leader.

REPORT CARDS

Reading the Report Card

Performance tests don't tell the whole story when it comes to home PCs. The features discussed below also distinguish one home system from the next, and often mean the difference between pleasure and pain for home PC users. We graded each of the systems in seven categories important to home users. The grades we used and their meanings are as follows: A, significantly above average; B, above average; C, average; D, below average; E, failing.

Setup focuses on how much setup assistance is provided for new users. Posters detailing how to get started, introductory videos, tutorials, color-coded cables, clearly labeled ports, and a Windows front end all help earn extra points for a system.

For the **software** category, we assess both the quantity and quality of the software shipped with a system. To earn a good grade here, a system must include a range of useful titles spanning the home-productivity, reference, entertainment, and education categories.

Performance is where we focus on the power and stability of the hardware. We consider processor performance, video performance, and the performance of the CD-ROM drive. We also take into consideration how well a system performed on our application-specific out-of-box software-compatibility tests.

The **sound** category involves how well a system fared on our subjective sound tests. Here we assess the quality of the sound board and bundled speakers when playing analog sound, .WAV, and MIDI files. To earn a good grade here, a system must play all three sound types clearly without distortion.

Upgradability indicates how easy it is to upgrade the various components of a system. We consider the number of available drive bays and slots, as well as how easy it is to get to them. The design and layout of the system are critical.

We derive the grades for **service and reliability** from *PC Magazine*'s 1995 Service and Reliability survey (January 10, 1995). In this survey, readers rated PC vendors on three key measures—satisfaction with reliability, technical support, and repair experience. To earn a grade of A, a vendor's scores on each of these three measures had to be significantly above the overall average.

Overall value encompasses all of the above, factored against the price of the system. To earn high marks here, a system must offer easy setup, a good selection of useful software, strong hardware performance, a high-quality sound system, lots of room for expansion, and a solid service and reliability record—all at a competitive price.

The AcerAcros Pentium Minitower includes the excellent, easy-to-use ACE Windows shell.

tion into bags labeled by categories, including Communications and Multimedia. But Acer's setup poster, though informative and attractive, has no information on the mini-tower version we reviewed.

What really distinguishes the AcerAcros is ACE (Acer Computer Explorer), an excellent user shell that neatly organizes Windows applets and bundled applications into groups such as Communications and Reference. Unlike other shells, ACE doesn't mask Windows entirely; it simply reorganizes everything into groups one is less likely to get lost in.

The AcerAcros had some of the lowest DOSMark and Winstone 95 scores among 75-MHz Pentium-based machines, and with its Mitsumi IDE CD-ROM drive, it finished near the bottom on our CD-ROM tests. The 1.2GB Seagate hard disk may not be the speediest, but it is one of the largest to be found among the home PCs in this roundup. This roomy minitower gives users plenty of upgrade space, including two available 3.5-inch drive bays, two 5.25-inch bays, two free ISA slots, and one PCI slot.

REPORT CARD

AcerAcros Pentium Minitower

Setup	A
Software	B
Performance	C
Sound	D
Upgradability	B
Service and reliability	B
Overall value	B

The sound quality of the machine proved to be less impressive. The AcerAcros turned in below-average performance on our subjective sound tests. This was largely due to the tiny, throwaway speakers bundled with the system. Acer's sound software is more impressive. The audio software makes it easy to play music and sound samples, but audiophiles will have to buy serious speakers before they're satisfied with the sound performance.

Acer's telephony offerings are rather impressive. The powerful SuperVoice package turns the AcerPower telephony board into a voice mail system that's fairly straightforward to customize and use. In addition to the sound and telephony software, the system includes America Online, Microsoft Encarta '95, Microsoft Works, NetCruiser, Prodigy, Quicken, and a handful of games—all preloaded.

The look of the AcerAcros Pentium Minitower (and of ACE) is certainly unique. If only the system's performance were as strong!—*AH*

▶ **AcerAcros Pentium Minitower.** List price: *$2,399.* Acer America Corp., *San Jose, CA; 800-368-2237, 408-432-6200; fax, 408-922-2953.*

Circle 441 on reader service card

AST Research Inc.

AST Advantage! Adventure 6075p

The $2,399 AST Advantage! Adventure 6075p manages to fit a fair number of interesting features into a tidy slimline case. This 75-MHz Pentium system combines a powerful front end, AST Works, with an impressive telephony subsystem and a well-balanced selection of software to create a total package that

CUT THE CORD.

TREAT YOURSELF TO SOME DESKTOP FREEDOM WITH MOUSEMAN CORDLESS.

- SUPERIOR RADIO TECHNOLOGY WORKS RIGHT THROUGH DESKTOP CLUTTER.
- REDUCE TEDIOUS MENU COMMANDS TO A MOUSE CLICK.
- NO MORE DOUBLE CLICKING! ASSIGN ALL DOUBLE CLICKS TO A SINGLE CLICK.
- MOST COMFORTABLE MOUSE YOU'VE EVER TRIED, OR RETURN IT WITHIN 60 DAYS.
- PLUG AND PLAY READY.
- THREE YEAR WARRANTY.
- TO RECEIVE PRODUCT INFORMATION BY FAX, CALL 1-800-245-0000, EXT. 4014.

Radio receiver tucks away anywhere on the desktop.

LOGITECH

CIRCLE 182 ON READER SERVICE CARD

Genius

ColorPage-I PRO

Color Page-I PRO from Genius is the 1200dpi Color Flatbed Scanner. Add the power of brilliant 24 bit true color images to your Windows based DTP and presentation packages. With the Color Page-I PRO, you get scanned images that are clear and beautiful. To help you create and achieve interesting images, you'll receive along with the Color Page-I PRO: Adobe Photoshop LE the image editing software, EasyReader the OCR software, and MediaMate the presentation software. Also available is an Auto Document Feeder for scanning up to 50 pages at a time and a Transparency Media Adapter for the scanning of film transparencies. For more information or for a dealer near you, call **1-800-456-7593**

CIRCLE 251 ON READER SERVICE CARD

MICROSOFT WINDOWS COMPATIBLE

Auto Document Feeder (optional)

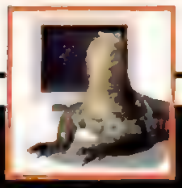
Transparency Media Adapter (optional)

COME SEE US at

NetWorld + InterOp 95, Las Vegas / Booth # 1433
Windows World 95, Atlanta / Booth # M6818
PC Expo 95, New York / Booth # 3680

KYE International Corp • 2605 E Cedar St • Ontario • CA • 91761 • USA

© 1995 KYE International Corp. All products and brand names mentioned are registered trademarks of their respective companies.



LOOK INTO AN LCD

SCEPTRE® TECHNOLOGIES

When space is at a premium or zero emissions is preferred, the Sceptre flat panel display meets the needs of demanding users. The new Sceptre LCD display panel offers a static free, flicker free, and radiation free environment at one of the most affordable prices. Our LCD provides the added health benefits of no radiation, reduced eye fatigue, and less risk of electric shock.

The detachable base allows the panel to be hung on the wall or just about anywhere. The base is adjustable to any angle. The first of 3 displays available is the CD-1011S, a high resolution, 11.4 inch dual scan color panel with a response time of 300ms.

Add on the convenience of lightweight portability, digital controls, and the elimination of the need for an AC adapter, and Sceptre's new LCD panel displays will change the way you look at monitors.

If you are looking into buying a proven business computer monitor look no further. *BYTE magazine

found the Sceptre 15-inch color monitor to be the "best overall" in performance and quality. PC Digest rated Sceptre's 15-inch #1 after combining scores for quality, usability, power consumption, and features.

Another popular monitor for business, graphics, and home use is the Sceptre 17" high resolution color monitor. Standards of high quality and performance, as well as user-friendly capabilities at a friendly price are displayed in this and all of todays Sceptre Technologies products.

ISO 9000

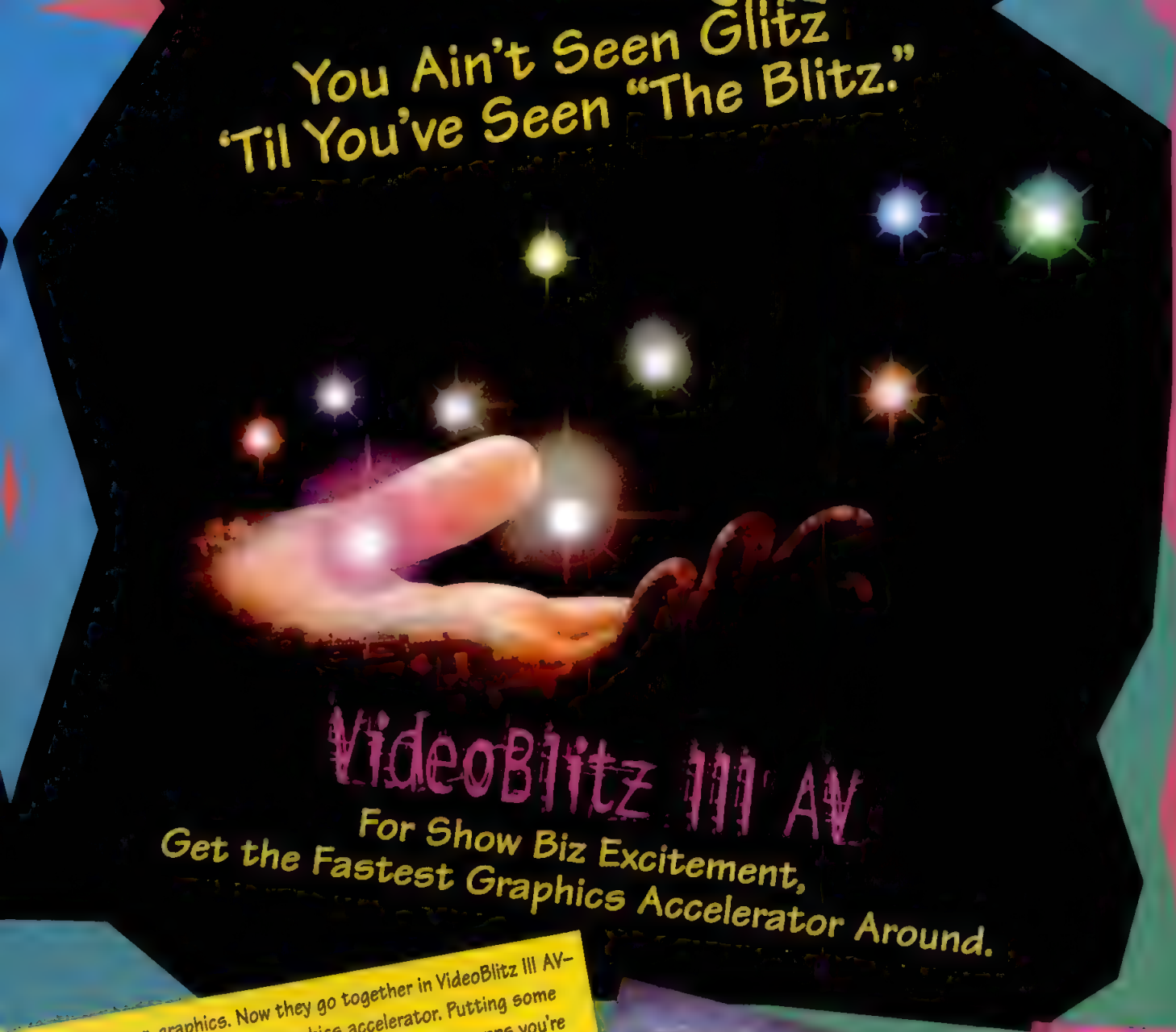
Toll Free: 1-800-788-2878

Please call us for more information, brochures and a free "Baby Brutus."

SOUND TECHNOLOGY WITH VISIONS FOR THE FUTURE

CIRCLE 256 ON READER SERVICE CARD

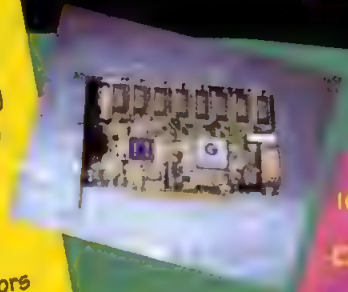
You Ain't Seen Glitz 'Til You've Seen "The Blitz."



VideoBlitz III AV

For Show Biz Excitement, Get the Fastest Graphics Accelerator Around.

Glitz, glamour, graphics. Now they go together in VideoBlitz III AV–Genoa's zappy 64-bit VRAM graphics accelerator. Putting some show biz into those biz shows and boffo multimedia apps you're running. With VideoBlitz III AV™, you'll be looking at awesome Big Picture windows. Resolutions cranked up to 1600 x 1200. Up to 16.8 million intense colors, at 1280 x 1024 res. And way higher frame rates–thanks to digital video acceleration hardware. So you'll see star-quality playback in AVI, Indeo and Cinepak video gigs, plus optional MPEG. Oh yeah, you wannabe directors can totally take charge with Genoa's free ProPilot™ utility-meister software. It's show time now at your dealer's–with our standing-room-only 2 or 4MB VRAM VideoBlitz III AV cards. Who ya gonna call? Try 1-800-93-GENOA today.



Multimedia

Audio

16-bit Stereo Sou

Quality Multimedia

MPEG Digital Video Vision

Service

VRAM Graphics VideoBlitz III AV

Multimedia

Quality Multimedia S

Graphics Position Support

Multimedia WindowsVGA

486 Pentium Motherboa

Genoa

SYSTEMS CORPORATIO

© 1995 Genoa Systems Corporation. VideoBlitz III AV and ProPilot are trademarks of Genoa Systems Corporation. All other trademarks and registered trademarks are properties of their respective owners.

Benchmark Tests: Home PCs

The nine home PCs we tested were based on Pentium processors with speeds ranging from 60 to 90 MHz. Though the processor types varied, overall system performance varied little.

What the Numbers Mean

WINSTONE 95

The two fastest systems were the Micron P90 Home MPC and the NEC Ready 9510, each based on a Pentium/90 chip and each running Microsoft Windows for Workgroups 3.11. The slowest systems were the Leading Edge Fortiva Series 5000 and the AST Advantage! Adventure 6075p. The AST unit lacked an L2 cache, which put it at a disadvantage on some tests. The Fortiva 5000 suffered from slow video and disk subsystems.

DOSMARK

In the DOS arena, the processor type greatly influenced how well a system performed. For this reason, the 90-MHz systems turned in much higher scores than the 60-MHz machines.

How We Tested

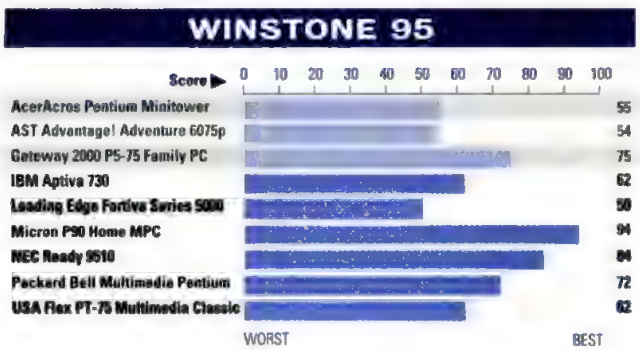
For all tests, we enabled the latest version of SMARTDRV.EXE provided on the tested system. We also used a cache size of 2MB, with write-behind caching enabled. For systems running Microsoft Windows for Workgroups, we set up a file cache of 2MB. We directed Windows to use a 20MB permanent swap file but did not change the vendor's setting for 32-bit disk access.

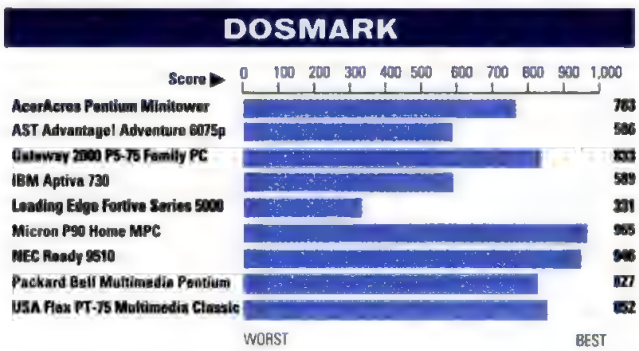
We used the custom graphics drivers for provided graphics chip sets and set resolution to 800-by-600 with 256 colors and small fonts.

We used our **benchmark test suite Winstone 95,** Version 1.0, to measure the machines' performance when running typical Windows applications. Winstone 95 measures the time a PC takes to execute a set of scripts that exercise 13 of the best-selling Windows 3.1 applications. Winstone weights a given PC's test timings based on the applications' unit market shares; it derives a composite number and converts it to a relative score (relative to the performance of a 386DX/25 Compaq Deskpro/M with 4MB of RAM, whose score is defined as 10). Winstone also produces system performance scores in four categories: word processing, spreadsheet, database, and business graphics/desktop publishing.

PC Bench 9.0 predicts processor, video, and disk performance under DOS applications. A composite PC Bench score, the **DOSMark,** is a summary of those three results that reflects overall system performance under DOS.

We also used two tests from Microsoft Corp.'s VidTest—a Windows-based, digital video performance test program—to evaluate CD-ROM performance. We used VidTest's Data Streaming test to determine CD-ROM maximum throughput and CD-ROM CPU utilization (results not shown).





should appeal to novice users.

Setting up the Adventure 6075p is a simple procedure, thanks to clearly labeled ports on the back of the machine. No setup poster is included with the system, though. AST Works, a customizable Windows front end, makes using the machine easy for even the most inexperienced of users. This software combines instructional videos and system information with intuitive program categories organized under headings such as Communications, Finance, and Reference.

The AST Works Windows front end makes the Adventure 6075p easy to use, even for novices.

REPORT CARD

AST Advantage! Adventure 6075p

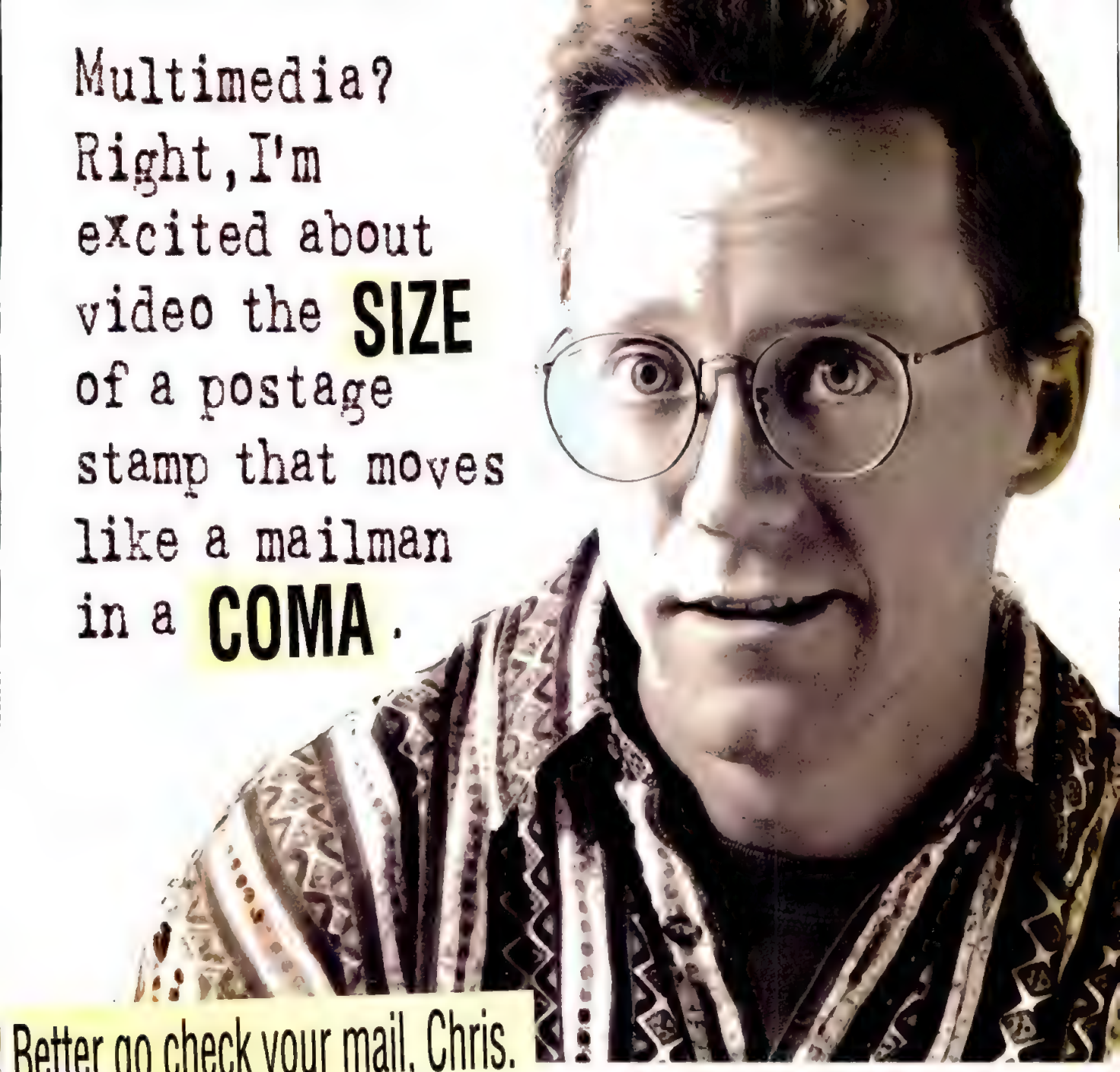
Setup	A
Software	A
Performance	C
Sound	B
Upgradability	C
Service and reliability	C
Overall value	B

The Adventure 6075p is easy for novices to use, but it doesn't offer the most impressive performance. This system turned in the worst DOSMark and Winstone 95 scores among the 75-MHz Pentium systems. The performance of its Toshiba quad-speed CD-ROM drive was more impressive. The Adventure 6075p also ranked near the top on our subjective sound tests; it includes a surprisingly good set of speakers made by AST.

The unit is definitely lacking in expansion capability. The Adventure 6075p includes a five-slot riser board with only one PCI and one ISA slot open. In addition, just one 3.5-inch and one 5.25-inch drive bay are available.

Where the Adventure 6075p distinguishes itself is in its powerful telephony capability. The AST StarCom telephony package is easy to configure and functions

Multimedia? Right, I'm excited about video the **SIZE** of a postage stamp that moves like a mailman in a **COMA**.



Better go check your mail, Chris.

RealMagic™ is here now! Just add the RealMagic card to your PC for smooth, realistic digital video and 16-bit digital audio. MPEG does it—the powerful new digital video and audio standard that puts the "real" in RealMagic.

RealMagic opens up a new world of interactive MPEG CD-ROMs including games, educational titles, music videos, movies and more. RealMagic is available as an MPEG playback card or a complete multimedia upgrade kit. What are you waiting for? Get RealMagic and get real multimedia.

OLD MULTIMEDIA

"Old" Video Image

REALMAGIC

Full Screen
Full Motion • Full Sound

For the store near you or more information on RealMagic, call

1-800-845-8086

CIRCLE 399 ON READER SERVICE CARD

RealMagic is available at:
COMPUSA COMPUTER CITY and other fine stores.

© 1994 Sigma Designs, Inc. The Sigma Designs logo is a registered trademark, and RealMagic and ReelMagic are trademarks of Sigma Designs, Inc. All other brand and product names are property of their respective owners.

REALmagic

as a full-fledged speakerphone; you can also link directly to Lotus Organizer, which comes preinstalled. The Adventure 6075p also comes with a microphone for issuing voice commands. No other telephony-oriented system we saw was as rich in features as this AST offering.

The selection of bundled software is equally impressive. There are more than 15 titles to choose from, including America Online, Microsoft Encarta '95, Microsoft Works, Prodigy, and Quicken, as well as some games.

As a final note, beware of the on/off switch. The round button is easy to spot and access but too easily triggered. Despite this quirk, the AST Advantage! Adventure 6075p is a well-rounded machine that's a good choice.—*AH*

▶ **AST Advantage! Adventure 6075p.** List price: *$2,399.* AST Research Inc., *Irvine, CA; 800-876-4278, 714-727-4141; fax, 800-926-1278.*

Circle 442 on reader service card

The Gateway 2000 P5-75 Family PC turned in some of the best scores on our tests.

Gateway 2000 Inc.

Gateway 2000 P5-75 Family PC

The sticker on the front of the case says "Family PC," but the first time you turn on the $2,299 Gateway 2000 P5-75 Family PC, you'll find there's not much of anything running on the system to live up to that claim. What you will find inside the box is a solid-performing 75-MHz Pentium system, good peripherals, and a useful selection of bundled software ready to install.

Though setup is easy, you will have to roll up your sleeves and get to work before you can enjoy the various titles and extras that Gateway 2000 includes. Everything is so clearly labeled and documented, though, that the task is hardly cumbersome. Open the bag marked "Family" and you'll find a colorful, easy-to-follow setup manual that makes getting started a fairly painless proposition. Novices expecting a front end or tutorial will be disappointed, however.

Gateway pushed the value bar a notch higher by including a Mitsumi quad-speed CD-ROM drive and an excellent set of Altec Lansing speakers that proved to be among the best on our subjective sound tests.

The Gateway P5-75 finished with one of the top DOSMark scores for 75-MHz systems and turned in the best performance of that group on our Winstone 95 tests. Its CD-ROM drive also performed well on our tests.

There is space aplenty for games and other software on the ample Western Digital 696MB hard disk. When it's time to expand the system, the Gateway P5-75's roomy desktop case is up for virtually anything; there are three free ISA slots, two available PCI slots, and two 5.25-inch drive bays. There's even room above the power-supply area for more peripherals, but you'll need to buy a mounting bracket before you try this.

REPORT CARD

Gateway 2000 P5-75 Family PC

Setup	B
Software	B
Performance	A
Sound	B
Upgradability	A
Service and reliability	A
Overall value	B

Gateway offers a decent selection of software titles from Microsoft, including Cinemania '95, Encarta '95, Fine Artist, Microsoft Golf, and Microsoft Works. The fax modem was installed and ready to go, but you'll have to scour up your own on-line connections; the Gateway P5-75 doesn't include any on-line software.

In fact, with no shells, preloaded software (beyond Cinemania), or extras such as a microphone or joystick, the Gateway P5-75 seems better suited to experienced home users than to novices. Still, the quality components and overall value make this one well worth considering.—*AH*

▶ **Gateway 2000 P5-75 Family PC.** List price: *$2,299.* Gateway 2000 Inc., *North Sioux City, SD; 800-846-2000, 605-232-2000; fax, 605-232-2023.*

Circle 443 on reader service card

IBM Personal Computer Co.

IBM Aptiva 730

The $2,794 IBM Aptiva 730 is definitely of the hide-it-away slimline school, where even the floppy disk and CD-ROM drives are concealed by a drop-down front panel. This makes for a tidy appearance and small footprint, but this 60-MHz Pentium machine doesn't add enough ease-of-use features to be truly attractive to the novice user and doesn't provide enough power and expandability for the experienced user. Instead, the Aptiva 730 takes the middle road.

REPORT CARD

IBM Aptiva 730

Setup	A
Software	C
Performance	C
Sound	B
Upgradability	D
Service and reliability	A
Overall value	C

Based on the amount of wrangling needed to get the tiny case open, it's clear that this is a machine designed for those who prefer to let someone else work under the hood. Once users get the machine running, they'll find a simple start-up menu that launches Microsoft Windows; from there, IBM creates a special window labeled AptivaWare. In it, you can launch tutorials from the Learning Library, explore the Custom Tools, and run programs from the enhanced directory tree entitled Your Software.

Slimline cases are cursed with minimal expansion capacity, and the Aptiva 730 offered the smallest number of expansion options in our roundup: only one 3.5-inch drive bay and one expansion slot that can be used for either an ISA or a PCI board.

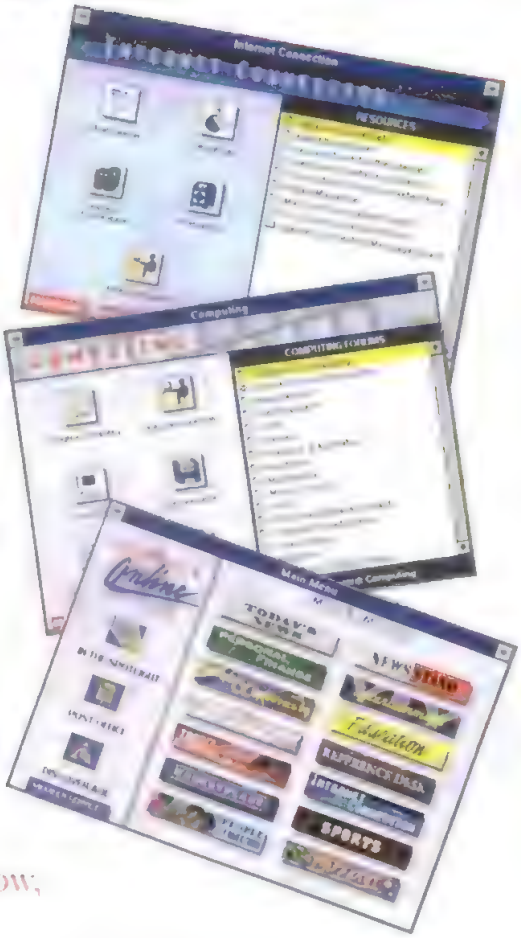
Fortunately, IBM chose some excellent components to cut down your need for immediate expansion: a roomy IBM 726MB hard disk, an Aria 16-bit wavetable sound card, speakers that placed

Own a Modem?

Try America Online FREE

FREE INTERNET ACCESS

If you own a computer and a modem, we invite you to try the nation's most exciting online service, America Online®, FREE.



- Build a personal software library by downloading from a library of over 120,000 files—games, graphics, multimedia programs and more!
- Navigate the Internet with ease through the Internet Connection.
- Get computing support from industry experts at online conferences and through easy-to-use message boards.
- Plus, unlimited e-mail, news updates, financial information, and live nationwide access to an electronic community.

We'll send you the software and give you 10 FREE hours to try America Online—risk-free.

Simply complete and mail the form below, or fax it to 1-800-827-4595.

Detach & Mail Today!
Must respond by 5/31/95

AMERICA Online®

Yes! I'd like to try America Online—FREE.

Send me the free software and trial membership. I understand there's no risk—if I'm not completely satisfied, I may cancel without further obligation.

NAME _____

ADDRESS _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

( ) HOME PHONE _____

SELECT DISK TYPE AND SIZE —

Windows*: ❑ 3.5

DOS: ❑ 3.5 ❑ 5.25 ❑ High Density ❑ Low Density

Apple: ❑ Macintosh®

Do you own a CD ROM? ❑ Yes ❑ No

*To use America Online for Windows, you must have a 386 PC or higher, 4MB of RAM, a VGA (256 color support recommended) monitor, a mouse, a modem, and a working copy of Windows 3.1. Use of America Online requires a major credit card or checking account. Limit one free trial per household. America Online is a registered service mark of America Online, Inc. Other names are service marks or trademarks of their respective owners.

11441

ATTENTION MODEM OWNERS!

RESPOND BY 5/31/95!

How Many of These America Online Services Could You Use Right Now?

- Issues of your favorite magazines online
- Free Internet access
- Up-to-date stock quotes and Morningstar Mutual Funds service
- Television networks and shows online
- Online software support and quick answers to questions

- Access to the latest U.S. and world news with Reuters®
- More than 120,000 software files and fast, easy downloading
- Multi-player graphic games
- Movie, video and game reviews
- Clubs, special interests, and hobbies

See other side for details about your FREE trial of America Online!

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT NO. 9096 VIENNA, VA

POSTAGE WILL BE PAID BY ADDRESSEE

AMERICA Online

8619 Westwood Center Drive
Vienna, VA 22182-9806

AMERICA Online

1-800-261-6611

The IBM Aptiva 730 includes good components but a below-par collection of bundled software.

near the top on our sound tests, a Mitsumi double-speed IDE CD-ROM drive, and on-board graphics built around the S3 Vision 864 chip set.

Though the Aptiva 730 is no slouch in its collection of parts and accessories, neither is it a standout performer. For one thing, the Aptiva 730 relies on the older, 60-MHz Pentium for processing power and is one of the few systems bundling Windows 3.1 in place of the more efficient Windows for Workgroups 3.11. The system did produce better DOSMark and Winstone 95 scores than the other 60-MHz machine in this roundup. Its Winstone score was higher than that turned in by some of the 75-MHz machines, proving that the Aptiva 730 is a more-than-adequate all-around Windows machine. Its CD-ROM drive fared better than most other double-speed drives on our CD-ROM tests.

This system doesn't offer much in terms of software, though. Knowledge Adventure's The Discoverers, PFS:WindowWorks, and Quicken make up the bulk of the goodies. The Aptiva 730 does comes ready to dial in to America Online and Prodigy, and includes PED Software's Journalist, a tool that allows you to customize Prodigy downloads. The Aptiva 730 also includes a special task automator that will let the machine turn on at a prescribed time to send a fax or collect your e-mail. These extras are innovative, but in a field where above-average performance and bundled extras rule the day, the Aptiva 730 seems a bit outdated.—*AH*

▶ **IBM Aptiva 730.** List price: *$2,794.* IBM Personal Computer Co., *Somers, NY; 800-426-3377.*

Circle 444 on reader service card

Leading Edge Products Inc.

Leading Edge Fortiva Series 5000

The $2,659 Leading Edge Fortiva Series 5000 distinguishes itself from the rest of the systems in this roundup only by its sheer lack of distinction. The most notable features of the 60-MHz Pentium-based Fortiva 5000 are easy setup and a good assortment of bundled software. But these features can be found in almost all the units in this group, most of which offer better performance for your money.

To assist new users in setting up the system, the Fortiva 5000 includes a poster-size guide and labeled ports on the back of the PC. Though the system doesn't include a custom Windows front end, it does go directly to Windows on boot-up. In Windows, users will appreciate the somewhat hard-to-locate but useful tutorial.

The Fortiva 5000 is a standard desktop system with average expansion capabilities. The 1GB Western Digital hard disk will hold off desires to upgrade for quite a while. Should you feel the need to expand, you'll find one 5.25-inch drive bay still available, as well as one free ISA slot and two PCI slots.

On our benchmark tests, the Fortiva 5000 generally performed near the bot-

The Macintosh Option: *The Performa 6110*

nry Norr

who love Macs *really* love Macs. feed them all the propaganda ld about how fast a 90-MHz thow much more software Windows-based PCs, and wper PCs are, but they th hese people, there is ma d Macintosh Perfor- Pe ple's answer to the mo me computer. sam me in a variety of Powich share the App their heart is a orie w processor past ts business- ne for the Apple, IBM, and Motorola, the PowerPC is based on RISC (reduced instruction-set computing), a performance-boosting technology previously available only in high-priced workstations.

The Performa 6110 models each include 8MB of RAM, a double-speed tray-loading CD-ROM drive (the Apple 300i), high-speed SCSI ports, a floppy disk drive that can read PC or Mac disks, Ethernet networking capabilities, 16-bit stereo sound, a 15-inch monitor with built-in stereo speakers, and an external 14.4-Kbps fax modem. The only difference among models is the size of the hard disk. You can get models with 250MB, 350MB, or 500MB.

With its 60-MHz PowerPC 601, the Performa 6110 doesn't quite match 90- and 100-MHz Pentium systems. And ranging from about $2,400 to $2,700, a Performa 6110 may cost a bit more than some Pentium systems. But if you want a Mac, this is the way to go.

If you do opt for the Performa, you won't lack for software. For starters, you get System 7.5—the latest version of the Mac operating system. It's packed with Windows 95 –like features such as longer file names and drag-and-drop. Most Performa 6110s also include ClarisWorks, Quicken, on-line software, and a variety of reference and entertainment titles. □

AWARD-WINNING SCANNERS AT NEW LOWER PRICES.

Whatever you buy a scanner for — document imaging, desktop publishing, high-end graphic arts — you want the best scanned image possible, the most advanced features and the highest value for your hard-earned dollar.

It's why, before you run the risk of spending more and getting less, you should consider Microtek.

Affordable Quality

Consider the **ScanMaker IIG** grayscale scanner, one of the most affordable flatbed scanners at a street price around $399.

Need color? Consider the **ScanMaker II** color flatbed, one of the best-selling scanners of all time, which is now available from most resellers around $500!

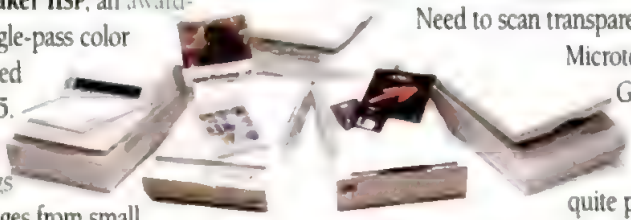
Looking for a fast, single-pass color scanner for office and graphic applications? The **ScanMaker IISP**, an award-winning single-pass color flatbed, priced around $575.

Enlarging line drawings or color images from small originals? Look into our high-resolution **ScanMaker IIHR**, one of the lowest priced color scanners available with true 600 x 1200 dpi optical resolution (2400 x 2400 dpi software enhanced) at street prices starting around $850.

Need professional quality scans? The award-winning 36-bit **ScanMaker III** (600 x 1200 dpi optical resolution/2400 x 2400 dpi software enhanced) has a palette of 68.7 billion colors and includes Microtek's DCR™ color calibration/correction system. *Publish Magazine* called the ScanMaker III "...the flatbed to beat". It was named *Hot Product of 1994* by *Electronic Publishing* and has a street price around $2700.

Need to scan 35mm slides? There's the very affordable **ScanMaker 35t**, 35mm slide and filmstrip scanner with a street price below Nikon, below Kodak and below Polaroid.

Need to scan transparencies on a Microtek color flatbed? Get the **TMA (Transparent Media Adapter)**, quite possibly the best engineered transparency option on the market.



HOT PRODUCT 1994 ELECTRONIC PUBLISHING ScanMaker III

MacUser 1994 ScanMaker III

IMAGE EDITORS' CHOICE ScanMaker IISP

Publish impact AWARDS '94 ScanMaker III

PC MAGAZINE EDITORS' CHOICE February 8 1994 Microtek ScanMaker IISP

Microtek has won more awards and has a history of more technological innovations than anyone else in the desktop scanner industry.

No matter how much you have to spend, Microtek has a scanner and bundle just right for you. Most Microtek scanners include **Caere's OmniPage Direct** OCR (optical character recognition) software in addition to powerful image-editing software like **Adobe Photoshop, Micrografx Picture Publisher, MicroFrontier's Color It!, Microtek's ImageStar II**, or **Microtek's PhotoStar**.

With prices starting around $399, you can be sure to find scanner that's right for you. more information, current prices, your nearest authc Microtek reseller, call ***1-800-654-4*** your request to 310-297-5050 or Microtek's convenient AutoTech f system by dialing 310-297-510 receive specific product inform your touch-tone phone.

MICROTEK

Better Images Through Innovation.

The following are trademarks or registered trademarks of their respective companies: PC of International Business Machines Corporation, Macintosh of Apple Computer, Inc., Adobe Photoshop of Adobe Systems, Inc., OmniPage Direct of Caere Corporation, Picture Publisher by Micrografx, Color It! by MicroFrontier. DCR (Dynamic Color Rendition), PhotoStar, ImageStar, MS-II, ScanMaker of Microtek Lab, Inc. All other trademarks or registered trademarks are the property of their respective holders. Prices vary outside the United States. Prices and specific software bundles are subject to change without notice.

CIRCLE 091 ON READER SERVICE CARD

Now! NRI gives you 3 great ways to make money in a computer career!

Master Computer Programming, Multimedia Programming, or Computer Servicing for Sure Success

Businesses everywhere promise solid employment prospects for people with the skills to create software for a Windows environment, program multimedia applications, or troubleshoot and service a full range of computers and peripherals. Now, you can train at home for success in today's hottest PC careers with your choice of three innovative NRI courses ...

Train with the most powerful computer system available in home study today! All three of these NRI courses include a state-of-the-art 486DX2/66 MHz computer system with all these great features:

- *Pentium Overdrive-ready motherboard*
- *Math coprocessor*
- *8 meg RAM*
- *420 meg hard drive*
- *3.5" floppy disk drive*
- *Super VGA color monitor*
- *CD-ROM drive with sound card*
- *Speakers*
- *Customized CD-ROMs*
- *Fax/modem*
- *Windows 95*
- *And more!*

1 Hands-on computer programming skills put you in demand!

The Bureau of Labor Statistics forecasts that job opportunities for computer programmers will boom in the next 10 years, with as many as 40,000 new jobs opening up by 2005.

Only NRI gives you in-demand programming skills in three of today's top computer languages — QBasic, C, and Visual Basic — as you train with and keep state-of-the-art programming tools: a powerful 486DX2/66 MHz multimedia computer system, Windows 95, and professional programming software.

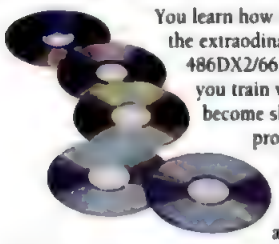
With NRI's unique Discovery Learning Method, you get hands-on programming experience as you learn to create the kinds of full-featured, powerful programs today's employers and clients demand.

Only NRI gives you the know-how and practical experience you need to build a top-paying career or a successful business of your own in this high-growth field.

2 Prepare for today's hot new multimedia programming opportunities

Pick up any computer magazine and you'll realize that multimedia is here to stay. If you can create the kinds of contemporary multimedia programs that make everything — from shopping to education to business presentations — easier and more exciting, you can expect financial success and job security.

NRI's newest programming course helps you explore multimedia from square one, so nothing will be a mystery to you as you bring text and graphics to life with sound, animation, and photo-quality images.



You learn how to take full advantage of the extraodinary capabilities of the 486DX2/66 MHz multimedia PC you train with and keep. As you become skilled with the professional-level Asymetrix ToolBook authoring software also included in your course, you'll be able to add drama and impact to all your computer applications, ultimately creating the kinds of dynamic programs that will put you at the forefront of multimedia technology.

3 Get in-demand computer servicing skills with NRI hands-on training

No other training — in school, on the job, anywhere — prepares you so thoroughly for today's money-making opportunities in computer service. And only NRI builds meaningful training around the kind of powerful computer system you'll be called on to service and repair in the real world.

As you explore your 486DX2/66 MHz computer system — complete with today's most popular features — you'll perform hands-on experiments and demonstrations that bring theory to life, giving you a total mastery of computer operation, troubleshooting, and repair.

What's more, your course includes professional-level diagnostic hardware and software from Ultra-X, today's leader in computer diagnostics. Step by step, you cover every important servicing technique you'll need on the job — from data recovery to peripheral repair, virus protection, system upgrading, and much more!

Find out more — call or write for your FREE catalog!

Only NRI's unique courses prepare you so completely for success in today's top-paying, cutting-edge computer fields. Learn more about what NRI training has to offer: bite-sized lessons, top-notch equipment, one-on-one instruction, a flexible study schedule, lifetime support, and much more. Request your FREE catalog today!

If the coupon is missing, write to NRI Schools, McGraw-Hill Continuing Education Center, 4401 Connecticut Avenue, NW, Washington, DC 20008

CALL 1-800-321-4634, Ext. 1217

SEND TODAY FOR YOUR FREE CATALOG!

NRI Schools
McGraw-Hill Continuing Education Center
4401 Connecticut Avenue, NW, Washington DC 20008

☑ **Check One FREE Catalog Only**
- ☐ **Computer Programming**
- ☐ **Multimedia Programming**
- ☐ **Microcomputer Servicing**

Other computer career courses:
- ☐ LAN Specialist
- ☐ Industrial Electronics & Robotics
- ☐ Electronic Music Technology
- ☐ PC Applications Specialist

Name _____ Age _____

Address _____

City _____ State _____ Zip _____

Accredited Member, National Home Study Council 156-0595

The Leading Edge Fortiva Series 5000 includes a strong selection of hardware.

tom of the pack. On our DOS Video tests, the ATI mach32 graphics accelerator helped the system post a score competitive with that of the IBM Aptiva 730, the only other 60-MHz Pentium in this roundup. The Fortiva 5000's DOSMark and Winstone 95 scores were both lower than those of the IBM system. And the Fortiva 5000 fared below average on our subjective sound tests, primarily because of the speakers included with the system.

When it comes to software, the Fortiva 5000 offers a more enticing package. Leading Edge includes preinstalled access to America Online, CompuServe, GEnie, and Prodigy, as well as InterNav—Delphi's Internet access software. The bundle includes some interesting applications, such as Interactive Publishing's Infopedia for reference, GameTek's Star Crusader for fun, and Microsoft Works and Money to enhance home productivity.

REPORT CARD

Leading Edge Fortiva Series 5000

Setup	A
Software	A
Performance	D
Sound	D
Upgradability	C
Service and reliability	D
Overall value	C

Though the software selection and start-up aids might make the Fortiva 5000 attractive to novice users, those interested in performance would do well to look elsewhere.—*William P. Flanagan*

▶ **Leading Edge Fortiva Series 5000.** List price: *$2,659.* Leading Edge Computer Products Inc., *Westborough, MA; 800-874-3340, 508-836-4800; fax, 508-836-4504.*

Circle 445 on reader service card

Micron Computer Inc.

Micron P90 Home MPC

PC MAGAZINE EDITORS' CHOICE

For a combination of solid performance, expandability, and ease of use, it's hard to top the $2,599 Micron P90 Home MPC. This 90-MHz Pentium-based system offers the solid performance that experienced users demand, coupled with the easy setup and useful software that novices require.

The Micron P90 tips its hat to beginners with a plain but surprisingly thorough quick-start setup card. The black-and-white diagrams are spare but point out all the ports and everything you need to get the system started. Then there's Microsoft Bob, without question the most elaborate Windows front end currently available for the computer newcomer. This friendly front end, which includes built-in applications, transforms your desktop into a home environment with rooms, sizable furniture, and individual family names and passwords for added security.

REPORT CARD

Micron P90 Home MPC

Setup	A
Software	A
Performance	A
Sound	C
Upgradability	A
Service and reliability	A
Overall value	A

With the Micron P90, Micron packs some pretty impressive peripherals into a roomy mini-tower case that you can easily open and close with a single large thumbscrew. From the 90-MHz Pentium CPU that drives the system to the double-speed Sony IDE CD-ROM drive, and from the fast Diamond Stealth 64 DRAM video card to the roomy yet nimble 812MB hard disk from Conner, the Micron is without question our dream system from a hardware point of view.

There's also a lot of room to grow in the Micron P90's mini-tower case. Three open ISA slots, two PCI slots, three full 5.25-inch drive bays and one 3.5-inch bay mean there's a place for anything you want to put inside this PC. The only middle-of-the road side to the Micron P90 is its KOSS speaker system.

While its sound performance was below average on our subjective sound tests, the Micron P90 proved to be a stellar performer in all other regards. Both its DOSMark and Winstone 95 scores were the highest of all the machines tested in this roundup. It also scored above average on our CD-ROM tests.

Though it may seem as if this system doesn't include much software, looks can be deceiving. Microsoft Bob includes a number of useful applications, including a Letter Writer, a Household Manager, a Checkbook, a Calendar, and E-Mail that allows you to connect to several of the leading online services. For those who favor more traditional applications, the system also includes Microsoft Works and Quicken. In addition, all the system software is provided on a single CD-ROM, so you won't have any trouble keeping track of your key software.

The combination of home-style software and sheer performance makes the Micron P90 Home MPC hard to beat.—*AH*

The Micron P90 Home PC combines powerful hardware with a well-rounded software bundle.

▶ **Micron P90 Home MPC.** List price: *$2,599.* Micron Computer Inc., *Nampa, ID; 800-388-6334, 208-465-3434; fax, 208-465-3424.*

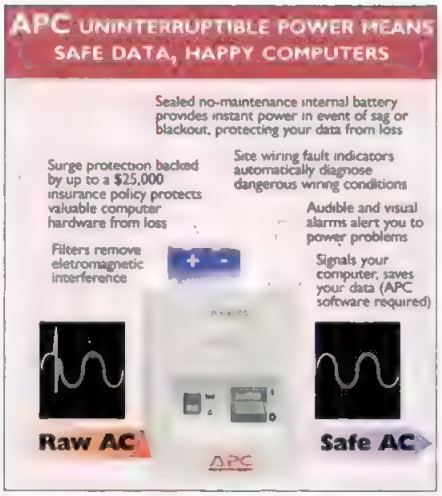
Circle 446 on reader service card

486, Pentium, PowerMac...
No matter how fast your PC is, it can't outrun a power problem
(Get Uninterruptible...starting at $119)

Just don't have the time for power problems on your PC? Don't worry. They'll always make the time for you. It's not if a power problem will occur, but when. Due to household appliances, poor wiring, bad weather or even other office equipment, power problems are as inevitable as death and taxes.

IN THE NEXT THREE MONTHS, MORE THAN 30,000,000 PCs WILL BE HIT BY POWER PROBLEMS...

In fact, you have better odds of winning the lottery than of escaping the sting of power problems on your PC. One study discovered a typical PC is hit over 100 times a month, causing keyboard lockups, hard drive damage, and worse. And since sags and blackouts represent more than 85% of power problems likely to hit your computer, standard surge suppressors are literally powerless to protect you. And a study in a recent *PCWeek* showed that the largest single cause of data loss is bad power, accounting for almost as much data loss as all other causes combined.



APC Uninterruptible Power Supplies provide instant battery backup to protect your data from loss and your hard drive from damage. Units are even backed by up to $25,000 in lifetime surge protection insurance.

PROTECT YOURSELF BEFORE YOU KICK YOURSELF...

Get instantaneous battery backup power from an APC Uninterruptible Power Supply and prevent keyboard lockups, data loss, and hard disk crashes. Surge protection performance is even backed by up to a **$25,000 Lifetime Equipment Protection Guarantee.**

Ask for APC at your computer reseller today or call for your FREE handbook.

Starting at just $119, an APC UPS is serious protection no serious computer user should be without.

PC MAGAZINE UK EDITORS' CHOICE

PC World Top 20 Upgrade

"Don't take chances...get the ultimate protection... from APC."--PCWorld

OVER 3,000,000 SATISFIED APC USERS...

"This is the best computer related purchase I have ever made! Has saved me hours of re-programming..."
Carol Irvine, Wizard Assoc.

"We reduced our maintenance costs the first year by 50% in repairs of equipment."
Valentin Gonzalez, Pfizer

"Our server was running a project when it lost power.. messed up all the data files. It took four days to recover. But we don't worry anymore since we got APC..."
Tony Chen, DeAnza Systems

"We were working on a state bid when the power went off. APC saved the day and year and future...about 800 pages of data saved thanks to APC."
Ravi Iyer, Software Galleria

"A power surge did significant damage to all of our systems except those protected by APC. The APC units were undamaged..."
C. Jeffrey, C. Jeffrey Eng.

"APC has virtually eliminated downtime in our corporate network."
Kurt Roemer, Searle Corp.

"Power went out while processing payroll! If not for APC, we would have had a walkout!"
Suzi Higgason, OSI Inc

Home office user Don Trites knows first-hand about APC reliability: "It ought to be against the law to buy a computer without an APC Back-UPS 250. I recently had a direct lightning hit right outside the house...my computer never blinked.

"APC lets me sleep better at night. How much would you pay to get back that one file you worked all day to complete for the boss who gets on the plane at 8:00 a.m? You should assume that you'll buy a UPS, not that it's some luxury item."
R. Morella, Westinghouse

"A power surge wiped out the FAT tables on all PC's not protected by APC. Now have APC installed on all.."
Craig Post, Comm. Tech.

"Before I purchased the UPS I had to put in at least two hard drives at $1000. With APC products...no new hard drives in two years!"
S. Foreman, LSP

FREE 60-PAGE HANDBOOK

What are the causes and effects of power problems? The most common power protection mistakes? Call for your free handbook today! Please reference Dept E4.

APC™

AMERICAN POWER CONVERSION

800-800-4APC

401-788-2797 fax / 800-347-FAXX faxback
132 Fairgrounds Rd., W. Kingston RI 02892 USA
A publicly-traded company (NASDAQ: APCC)

CIRCLE 162 ON READER SERVICE CARD

SUMMARY OF FEATURES

Home PCs

■ YES ▨ NO
Products listed in alphabetical order

	AcerAcros Pentium Minitower	AST Advantage! Adventure 6075p	Gateway 2000 P5-75 Family PC	IBM Aptiva 730	Leading Edge Fortiva Series 5000	Micron P90 Home MPC (PC MAGAZINE EDITORS' CHOICE)	NEC Ready 9510
List price (tested configuration)	$2,399	$2,399	$2,299	$2,794	$2,659	$2,599	$3,054
Processor	Pentium/75	Pentium/75	Pentium/75	Pentium/60	Pentium/60	Pentium/90	Pentium/90
Installed/maximum motherboard RAM	8MB, 128MB	8MB, 128MB	8MB, 128MB	8MB, 128MB	8MB, 64MB	8MB, 128MB	16MB, 128MB
Installed/maximum external RAM cache	256K, 256K	None, none	256K, 256K	256K, 256K	256K, 1MB	256K, 256MB	256K, 256MB
Motherboard manufacturer	Acer	AST	Intel	IBM	Daewoo	Micronics	NEC
Chip set manufacturer	Intel	VLSI	Intel	VLSI	OPTi	VLSI	SIS
BIOS manufacturer and version (or date)	Acer V20R02C0	AST 1.04	AMI100.11AX1	IBM 2.01-01J	Phoenix 4.0	Phoenix 4.04	Phoenix 4.04
Flash BIOS/16550 UART chip	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■
Expansion slots	5 ISA, 3 PCI	3 ISA, 2 PCI	5 ISA, 3 PCI	3 ISA, 2 PCI	5 ISA, 3 PCI	6 ISA, 2 PCI	4 ISA, 2 PCI
Parallel, serial, mouse ports	1, 2, 1	1, 2, 1	1, 2, 1	1, 2, 1	1, 2, 1	1, 2, 1	1, 2, 1
Graphics adapter (and memory)	Cirrus Logic CL-GD5434 (2MB)	Cirrus Logic CL-GD5430 (1MB)	STB S3 TRIO64 (2MB)	S3 Vision864 (1MB)	ATI Mach32 (1MB)	Diamond Stealth S3 Trio 64 (2MB)	Cirrus Logic CL-GD5434 (2MB)
Hard disk capacity and interface	1.2GB IDE	514MB IDE	698MB IDE	726MB IDE	1.03GB IDE	812MB IDE	1.2GB IDE
CD-ROM drive (and speed)	Mitsumi (4x)	Toshiba (4x)	Mitsumi (4x)	IBM (Mitsumi) (2x)	Aztech (2x)	Sony (2x)	Mitsumi (4x)
Speakers	Acer	AST (Quickshot)	Altec Lansing	Jazz Hipster	Hi-Tex	KOSS	Labtec
Audio/Microphone/Headphones	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Modem/Telephony/Radio	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■	■ ■ ■
Setup poster/Getting-started video	■ ■	▨ ▨	■ ■	■ ■	■ ■	■ ■	■ ■
Windows front end	■	■	▨	■	▨	■	▨
Labled ports/Color-coded cables	■ ■	■ ■	■ ■	■ ■	■ ■	■ ■	▨ ▨
Accessible drive bays (5.25", 3.5")	3, 2	2, 1	3, 1	1, 1	2, 1	3,1	3, 1
Internal drive bays (5.25", 3.5")	0, 2	0, 1	0, 3	0, 2	0, 1	0,2	0, 2
Power supply (and number of connectors)	200W (8)	145W (4)	145W (6)	145W (4)	200W (6)	200W (6)	200W (4)
Monitor manufacturer (and diagonal screen size)	Acer (15")	Daewoo (15")	Sony (15")	IBM (14")	Daewoo (14")	Micron (15")	NEC (15")
System software	DOS 6.22, WfWG 3.11	DOS 6.22, Windows 3.10	DOS 6.22, WfWG 3.11	PC DOS 6.3, Windows 3.10	DOS 6.22, Windows 3.10	DOS 6.22, WfWG 3.11	DOS 6.22, WfWG 3.11
Dealers/Direct-distribution channel	▨ ■	■ ▨	▨ ■	■ ■	■ ▨	▨ ■	■ ■
Warranty on parts and labor	3 years	3 years	3 years parts, 1 year labor	3 year	3 years carry-in, 1 year on-site	1 year	3 years
On-site service (1 year)	Included	Included	Included	Included	Varies	Included	Included

NEC Technologies Inc.

NEC Ready 9510

It's a server. It's a slimline. No, it's the $3,054 NEC Ready 9510, a 90-MHz Pentium system that positions itself as a home PC but isn't designed like one. Though it proved to be a capable performer on our benchmark tests, the Ready 9510 displays a distinct split personality when it comes to design and functionality.

Nothing is labeled on the back of the Ready 9510. Your best guess is about all there is when you're trying to identify keyboard ports and COM ports. This can be very disconcerting when the time comes to plug things in, particularly for those used to buying clearly labeled hardware. And you can forget about easy expansion-board installation; the Ready 9510 hangs a riser card upside down inside the oversize mini-tower case, and the only way to add any sort of board is to dismantle the bottom of the unit—something you'll probably try only after needlessly taking off the giant cover. This is hardly the sort of design we expect in a home PC.

The unusual design of the NEC Ready 9510 makes it tough for novice users to expand the system.

Still, the Ready 9510 doesn't totally ignore novice users. As a nod to this audience, the system includes Microsoft Bob, a package that features a graphical, friendly Windows front end with integrated applications.

In terms of performance, the NEC Ready fared well, posting second-place DOSMark and Winstone 95 scores and managing excellent performance on our CD-ROM tests. This decidedly impressive accomplishment is largely due to its 90-MHz Pentium and excellent component mix, which includes a Mitsumi quad-speed CD-ROM drive, a massive 1.2-gigabyte hard disk from Conner, and an adequate sound system (with better-than-average Labtec speakers). Once you get in the case, you'll find four free ISA and two free PCI slots, along with a fair number of

	Packard Bell Multimedia Pentium	USA Flex PT-75 MultiMedia Classic
	$2,000	$2,389
	Pentium/75	Pentium/75
	8MB, 136MB	8MB, 128MB
	256K, 256K	256K, 256K
	Packard Bell	Intel
	Intel	Intel
	AMI 1.0012 B8OR	AMI 100.12AX1
	■■	■■
	3 ISA, 2 PCI	5 ISA, 3 PCI
	1, 1, 1	1, 2, 0
	Cirrus Logic CL-GD5434 (1MB)	Diamond Stealth S3 Trio64 (2MB)
	812MB IDE	814MB IDE
	Matsushita (2x)	Mitsumi (4x)
	Packard Bell	Micro Innovations
	■■■	■■■
	■■■	■■■
	■■	■■
	■	■
	■■	■■
	2, 1	3, 2
	0, 1	0, 1
	150W (4)	200W (4)
	Packard Bell (15")	CTX (15")
	DOS 6.22, WfWG 3.11	DOS 6.22, WfWG 3.11
	■■	■■
	1 year	3 years parts, lifetime labor
	Included	$49

assorted drive bays.

When you turn on the system, you'll find a carefully selected set of software. This set includes a customized version of Microsoft Bob, which loads icons of NEC's phone/answering machine and stereo programs right in the Bob living room. Also available is a better-than-average telephony setup, which includes a highly usable speakerphone and a microphone.

For those who prefer standard Windows, the Ready 9510 includes a home-office program group, where there are preloaded copies of Encarta '95, Microsoft Works, Paint Shop Deluxe, Quicken, TurboTax, and a title from Brøderbund's Living Books series. For those eager to expand into the on-line world, NEC Technologies includes preloaded software for all of the major on-line services, including America Online, CompuServe, Prodigy, Sierra Online's ImagiNation Network, and even NetCruiser.

What makes the Ready 9510 so unusual is the way it combines software that's appealing to novices with a case design that clearly does not belong in the home. This system may not be ready for novice home users until NEC refines the design.—*AH*

▶NEC Ready 9510. List price: *$3,054.* NEC Technologies Inc., *Boxborough, MA; 800-632-4636, 508-264-8000; fax, 508-264-8673.*

Circle 448 on reader service card

REPORT CARD NEC Ready 9510	
Setup	D
Software	A
Performance	A
Sound	C
Upgradability	C
Service and reliability	C
Overall value	C

Packard Bell Inc.

Packard Bell Multimedia Pentium

With more than 20 bundled titles, setup that couldn't be easier, and solid performance, Packard Bell really goes the extra mile toward making a person's first foray into computing an enjoyable experience. Novices will appreciate the $2,000 Packard Bell Multimedia Pentium's easy setup, while seasoned users will appreciate the competitive performance of the 75-MHz Pentium CPU.

REPORT CARD Packard Bell Multimedia Pentium	
Setup	A
Software	A
Performance	B
Sound	C
Upgradability	C
Service and reliability	E
Overall value	B

On opening the box, you'll see the setup poster, which contains pictures and diagrams as well as Packard Bell's 800 number and directions on how to reach the company on CompuServe and Prodigy (both of which come preloaded on the system). Packard Bell goes one step further by color-coding all the ports and the respective cables.

Once the system is on, the user enters Packard Bell's Navigator software, a custom front end to Windows that provides easy access to all installed applications and serves as a tutor for new users. From here the user can launch and control the unit's telephony features, which include a telephone and answering machine.

Inside its desktop-size case, the Packard Bell Multimedia Pentium features a riser-card design, which limits the amount of expansion room. There are, however, two ISA slots and one PCI slot still available to the user. Only one 5.25-inch drive bay is still available, but the 812MB Seagate hard disk should hold off the need for additional storage for some time.

On our performance tests, the Packard Bell Multimedia Pentium proved itself competitive in both the Windows and DOS arenas. The system's DOSMark and Winstone 95 scores were better than average for the 75-MHz systems in this review. On our CD-ROM tests, the unit's Matsushita drive performed satisfactorily. The system's sound capabilities were only average; the integrated speakers, which are bolted to the sides of the monitor, are an attractive design feature, but they fail to provide the most competitive sound quality.

The large selection of software bundled with the Packard Bell Multimedia Pentium runs the gamut from productivity packages such as Microsoft Works and Money to reference titles such as Sports Illustrated's Almanac and the U.S. and World Atlas. There are also a number of games and interesting children's titles. For further peace of mind, a system CD is also included.

The Packard Bell Multimedia Pentium offers the most software of all the systems in this roundup.

Click, Click,

PC/Computing

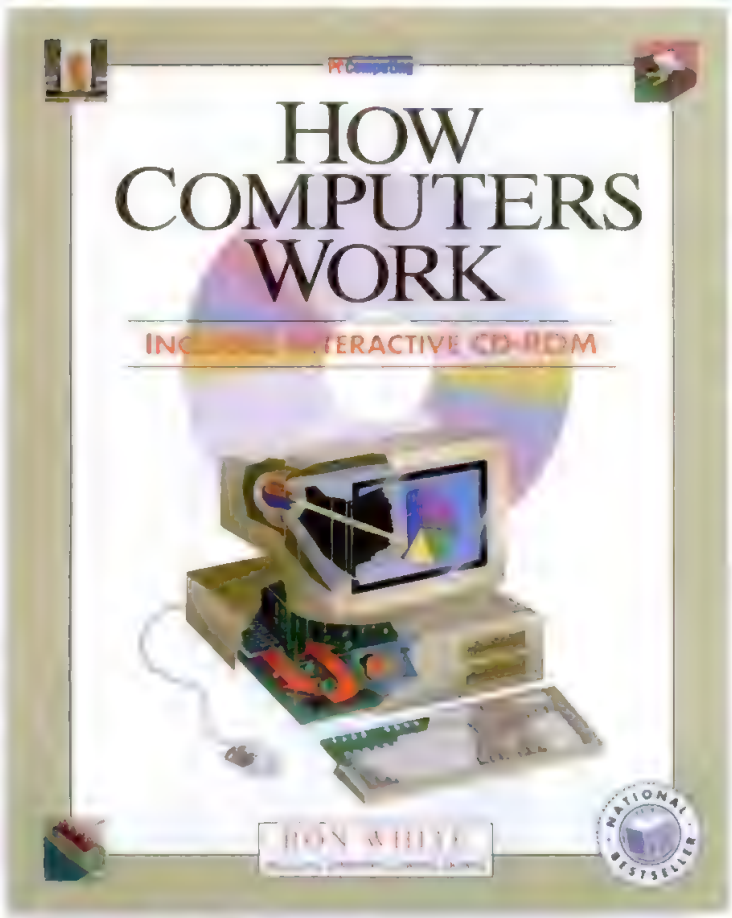
How Computers Work

CD-ROM/Book

extravaganza

from

Ziff-Davis Press.

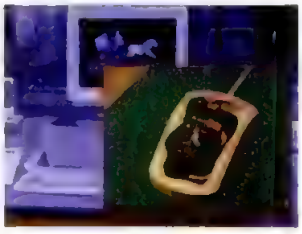


ISBN 1-56276-250-8 Price $39.95

WHIZ

Click your way through an electrifying multimedia voyage to the heart of the computer with *How Multimedia Computers Work*—a unique CD-ROM packaged with the classic best-selling book *PC/Computing How Computers Work*.

In *How Multimedia Computers Work*, fun, fast-paced, fascinating tours of your computer's incredible innards combine state-of-the-art 3D animation with lively dialog and music for a richly interactive sensory feast. Also included are provocative video interviews with well-known computer industry figures—plus tons of computing tips from the top authors at Ziff-Davis Press. Teamed up with a book that has already shown legions of computer users what makes their machine tick, *How Multimedia Computers Work* is a real whiz-bang experience that's sure to make you see your computer in a whole new light.



Ask your favorite bookseller for *PC/Computing How Computers Work* with *How Multimedia Computers Work* on interactive CD-ROM.

BANG

Ziff-Davis Press books are available at all fine bookstores, or call 1-800-688-0448, ext. 225.

ZIFF-DAVIS ZD PRESS

© 1994 Ziff-Davis Press

COME SEE US AT WINDOWS WORLD '95, #N5764

THE BEST 28,800 BPS CONNECTION

SupraFAXModem™ 288—starting at $219.95

It's time to separate theory from reality. Some 28,800 bps modems claim to be four-times faster by offering sensationally high throughput. But sensational throughput depends on sensational phone line conditions. Not a reality in today's telecommunications. In the real world of less-than-perfect phone lines, the SupraFAXModem 288 outperforms all the competition. But don't take our word for it — just look at the reviews. It has also won award after award for outstanding value. For a surprisingly low price you get Supra's top-of-the-line feature set including: **Silent Answer™** for voice and fax line sharing, **Flash ROM** for easy field upgrades, **top-rated fax and data software**, and **Supra's five-year limited warranty.** Plus, all internal PC models are designed with **SupraSmart™ technology** for a super-efficient modem-to-computer interface! It's time to separate theory from reality — the SupraFAXModem 288 offers the best 28,800 bps connection available. And that's a fact. **Call Supra at 800-727-8417 today.**

PC Best
PC Computing BEST 200 June 1994

Supra Corporation

NOW WITH V.34 28,800 bps

Specifications subject to change. All trademarks belong to their respective companies.

7101 SUPRA DRIVE SW • ALBANY, OR 97321 USA • PHONE: 503-967-2410 • FAX: 503-967-2401 • SUPRA GmbH • CARL-FRIEDRICH GAUSS STRASSE 7 • D-5024 PULHEIM-BRAUWEILER • GERMANY • PHONE: 49-22-34-98590

"Its ability to plug-away through poor line conditions puts it in a whole new league." Computer Shopper, July 1994

1st Place – PC Computing, *"Great bundle with bargain price–our winner was a favorite with testers."* **June 1994.**
★★★★ – MACWORLD, *"Supra is paving the way for life in the fast lane."* **August 1994.**

CIRCLE 183 ON READER SERVICE CARD

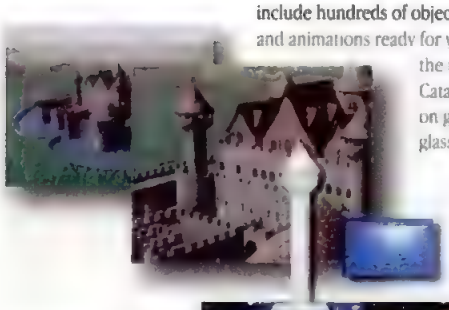
When you're 11 years old and you've lived through as much as Palani, even the chance to attend school is something. But today, Palani not only goes to school, she plays the cello and she's active in athletics. Thanks to Easter Seals, Palani has gotten academic tutoring, she's gone to camp, and she's received a wheelchair. In fact, she's even gone on to win medals in the Junior National Wheelchair Games. All of which have given her the chance every kid deserves: the chance to be a kid. Palani is just one of millions of children and adults with disabilities that Easter Seal quality rehabilitation programs have helped. Give to Easter Seals. **GIVE THE POWER TO BECOME.**

Easter Seals®

Do You Want to Design 3D Worlds, or Mix the Cement?

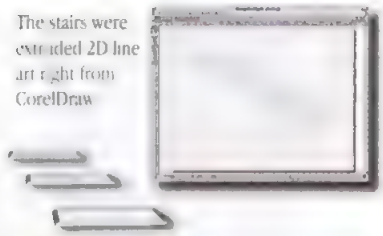
$299

Simply Scenes' fully modeled 3D worlds include hundreds of objects, materials, images and animations ready for your artwork. Just grab the tower from the Catalog, ***drag and drop*** on glass, and you've got a glass tower. It's that easy!



A star field is just one of the effects you can create in **Visual Image**.

The stairs were extruded 2D line art right from CorelDraw



Visual Catalog displays all the objects, materials and images from any 3D scene. ***Drag and drop*** any element quickly into your new design

Choose a font from **Visual Font**, type in the word and it instantly becomes a 3D object

Use the included 3D clip art and materials to create the planet

Objects and shapes can be quickly modeled in **Visual Model**.

Textures, decals and logos can be imported from draw and paint programs.

There's no easier way to create stunning 3D graphics and animations than with **Visual Reality**. For example, pick a 3D object from a 3D scene. Hit the render button. Drop it into your 2D graphic. You've just completed a new world, or an out-of-this-world annual report! Faster than ever before.

But you get a lot more than just spare time with **Visual Reality**. We include a power modeler to build your own objects, a font tool to create 3D letters, a layer-based image editor, the world's fastest renderer, 1500+ business objects and textures, and the slickest rendering and camera animation tools for multimedia projects. From presentations to fine art, print ads to interactive CDs, no other Windows™ software gives you so much for so little. Create new worlds with Visual Reality. If you can't be God, at least act like him!

Order **Visual Reality** by calling **800-881-4108**.

CIRCLE 373 ON READER SERVICE CARD

Babbage's · COMPUSA · Computer City · MEDIA PLAY · MICRO CENTER · SOFTWARE ETC

Visual Reality, Visual Catalog, Simply Scenes, Visual Model, Visual Font and Visual Image are registered trademark of Visual Software, Inc.
All other trademarks are registered trademarks of their respective companies

VISUAL SOFTWARE
Visual Software, Inc.
21731 Ventura Blvd., Suite 310
Woodland Hills, CA 91364-1868
Fax (818)593-3750

VB Power

ISBN: 1-56276-073-4
Price: $34.95

This innovative guide by Dan Appleman turns Visual Basic programmers into power users by illuminating the tools of the Windows Application Program Interface (API). Includes a time-saving disk that contains source code from the examples in the text, plus a specially designed dynamic link library (DLL).

Available at fine bookstores, or call
1-800-688-0448
ext. 8448

ZIFF-DAVIS ZD PRESS

© 1993 Ziff-Davis Press

The combination of easy setup, strong performance, and ample selection of bundled software makes the Packard Bell Multimedia Pentium a smart investment.—*WPF*

▶ **Packard Bell Multimedia Pentium.** List price: *$2,000.* Packard Bell Electronics Inc., *Westlake Village, CA; 800-733-5858, 818-865-1555; fax, 801-579-0092.*

Circle 448 on reader service card

USA Flex

USA Flex PT-75 MultiMedia Classic

The $2,389 USA Flex PT-75 MultiMedia Classic offers an overwhelming array of materials. There are more than 14 software titles, 12 manuals, and 7 system disks included with the unit. You clearly won't have to run to the software store after setting up this 75-MHz Pentium PC. And actually getting the system up and running for the first time should prove to be no burden; setup instructions are clear and easy to follow. USA Flex does little else for the novice, however: The system doesn't provide a Windows front end or any on-line tutorials.

REPORT CARD

USA Flex PT 75 MultiMedia Classic

Setup	B
Software	A
Performance	C
Sound	C
Upgradability	A
Service and reliability	N/A
Overall value	B

N/A—Not applicable: USA Flex did not receive enough responses to be included in our 1995 Service & Reliability survey.

The hardware selection inside the machine is almost as appealing as the software selection. In outfitting the machine, USA Flex went all out, equipping it with a Mitsumi quad-speed CD-ROM drive, a roomy Seagate 814MB hard disk, and a Diamond Stealth 64 DRAM graphics adapter. The pedigree of these components proved itself on our performance tests.

The system's DOSMark score was first among scores posted by the 75-MHz units, and its CD-ROM performance was impressive. But its Winstone performance was about average. The Turtle Beach Monte Carlo sound board and Micro Innovations speakers should be adequate for all but the most discerning music lovers. The system turned in average performance on our subjective sound tests.

This desktop unit is built for expansion. With three available ISA slots, two PCI slots, three 3.5-inch drive bays, and one 5.25-inch bay, the desktop case gives you ample room to grow. Be warned, though: One of the expansion slots is a shared ISA/PCI either/or arrangement. The floppy disk drive is also mounted in the 5.25-inch drive bay—an oddity given the number of 3.5-inch bays to choose from.

With so many home-oriented software titles—including Compton's Home collection, Corel CD Power Pak, Grolier's Encyclopedia, and Time Almanac—the USA Flex PT-75 is hard to fault for not being very home-oriented. It is missing most of the on-line software packages but does include the disk and sign-up brochure for America Online and sign-up pamphlets for CompuServe and GEnie, as well as a 14.4-Kbps fax modem, installed and ready to go.

The USA Flex PT-75 MultiMedia Classic offers a solid package but few aids for novice users.

The USA Flex PT-75 creates a solid balance between performance and value but forgets the novice user in the equation. Though it's not ideal for those in need of hand-holding, this is a machine well worth holding on to for the rest of us.—*AH* □

▶ **USA Flex PT-75 MultiMedia Classic.** List price: *$2,389.* USA Flex, *Bloomingdale, IL; 800-872-3539, 708-351-9700; fax, 708-351-7204.*

Circle 449 on reader service card

EXPLORE the INTERNET!

FREE*

10 Hours FREE*

Delphi Internet™ offers you full access to the Internet and now you can explore this incredible resource with no risk. You get 10 hours of evening and weekend access to try it out for free!*

Use Delphi Internet's mail gateway to exchange messages with over 30 million people at universities, companies,and other online services such as CompuServe® and MCI Mail®. Download programs and files using **FTP** or connect in real-time to other networks using **Telnet.** You can also meet people on the Internet. **Internet Relay Chat** lets you "talk" with people all over the world and **Usenet News** is the world's largest bulletin board with over 20,000 topics!

now supporting 9,600 and 14,400 bps at no extra charge!

To help you find the information you want, you'll have access to powerful search utilities such as **Gopher**, **Hytelnet** and **WAIS**. If you aren't familiar with these terms, don't worry; Delphi Internet has hundreds of expert online assistants and a large collection of help files, books, programs, and other resources to help get you started.

Over 850 local access numbers are available across the country. Explore Delphi Internet today. You'll be amazed by what you discover.

TEN HOUR FREE TRIAL!*

Dial By Modem 1-800-365-4636, Press return until you get a prompt

At Username, enter JOINDELPHI. At Password, Enter PCM595A

*Free offer applies to new members only. limit one per household. and is valid for a limited time. A valid credit card is required for immediate access. Free time may be used only during the remainder of the calendar month of becoming a member. Telcom surcharges apply during business hours (6am to 6pm weekdays) via Tymnet or SprintNet and for access outside the mainland US. New members must agree to Terms and Conditions of membership when joining. Complete details and other restrictions are provided during the toll-free registration. DELPHI INTERNET is a trademark of Delphi Internet Services Corporation.

Attention Current Internet Users: See what Delphi Internet can offer you! Stock quotes, Grolier's Encyclopedia, newswires, and hundreds of other services are just a few keystrokes away. Telnet to delphi.com and enter the username and password above for a free trial.

DELPHI INTERNET™

Questions? Call 1-800-695-4005.
Send e-mail to INFO@delphi.com

©1995 Delphi Internet Services Corporation

CIRCLE 050 ON READER SERVICE CARD

HEADS, IT'S REAL. TAILS, IT'S FAKE.

It's your choice. A little more than 50 percent of all business software in use today is pirated.

You might save a few bucks on it—but when phony software doesn't work, forget calling for product support. When it infects *your* computer with a deadly virus, it'll be your work that gets lost. The documentation is nonexistent or inadequate, so that won't help. And, of course, there will never be any product upgrades.

Selling or copying software without authorization is against the law, with severe criminal and civil penalties including imprisonment of up to five years, fines of up to $250,000, or both. If you suspect the sale or use of pirated software, call the BSA Anti-Piracy hotline:

(800) 688-BSA1 (2721)

BSA Business Software Alliance

© 1993 Business Software Alliance. All rights reserved.

Get 3D Surround Sound From Your PC with Only Two Speakers!

It's Easy!

Add One Vivid 3D Sound Enhancement Product to Your Existing PC with Any Sound Card and Two Ordinary Speakers

Surround Yourself with 3D Sound From Only Two Speakers

Current audio technology fails to recreate the ambience and realism of a live performance. The best PC sound cards deliver only stereo, and multimedia speakers often sound flat. But Vivid 3D™ products from NuReality produce sound that's more powerful and realistic than anything you've heard before. With patented SRS (●)* technology, Vivid 3D products immerse you in true-to-life 3D sound *from only two speakers.*

Experience Vivid 3D Sound FREE!*

Vivid 3D products are designed to overcome the acoustic limitations of a PC environment. You'll hear remarkable 3D sound regardless of how close you sit to your speakers, or how near your speakers are to each other. You'll experience a full acoustic soundstage and hear sound all around you—just like the actual performance

Vivid 3D Pro
Only $149.95

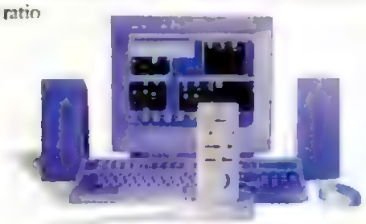
Compatible with All Sound Boards and Applications

Vivid 3D products are fully compatible with all PC sound cards—including Creative Labs, Media Vision, Turtle Beach, Aztech, Advanced Gravis, Roland, and all other 8-bit, 16-bit and wavetable sound cards. Vivid 3D products are also easy to use with Macintosh computers. Vivid 3D products add audio excitement to any PC application, audio CD or CD-ROM—whether it's mono, stereo or encoded.

"By far the best 3-D results I've heard.... your audio world opens up spatially."
PC Magazine**

Audiophile Grade Electronics

With the latest in microelectronics, Vivid 3D products create audiophile-quality sound for your PC. Vivid 3D products feature high precision components for accurate sound reproduction, sophisticated surface mount technology and a professional level signal-to-noise ratio



Easy To Install

Vivid 3D products install in minutes, and require no software for installation. Simply plug the product in between your sound card and speakers with the included cables, and you're wired for 3D sound!

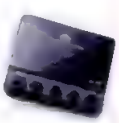
Works with Your Stereo, TV or VCR

Vivid 3D products also create 3D sound from your VCR, TV, stereo receiver, satellite TV or video game system. Vivid 3D products are fully compatible with Dolby Pro Logic® and other surround sound technologies.

Award-Winning Vivid 3D Products

The Vivid 3D Pro incorporates a powerful 35 watt amplifier in a futuristic enclosure, and an LED display. The Vivid 3D Plus provides an even more affordable way to add 3D sound to your computer.

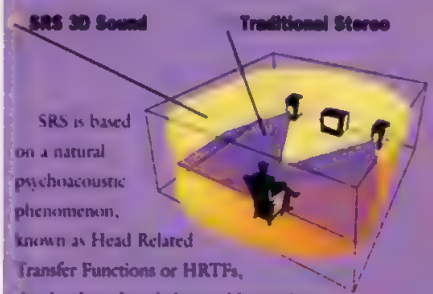
The Vivid 3D Pro and Vivid 3D Plus feature innovative controls that allow you to customize your sound output. The space control changes the "width" of an audio image. By adjusting the center control, you can bring up the most prominent part of a recording, such as a vocalist or lead soloist.



Vivid 3D Plus
Only $79.95

What is SRS 3D Sound?

The Sound Retrieval System SRS (●)* technology uses psychoacoustic principles to create a continuous three-dimensional sound field from only two speakers. SRS technology is the result of more than 10 years of research, and holds four U.S. patents. Sony and RCA Corporation currently use this technology in their high-end home theater televisions.



SRS is based on a natural psychoacoustic phenomenon, known as Head Related Transfer Functions or HRTFs, that has been largely ignored by modern sound reproduction technologies, including stereo and surround sound. HRTFs allow your brain to localize sound because the spectral characteristics, or frequency response, of the sound varies depending on its location. These "spatial cues" supplied primarily by the outer ear, or pinna, are transferred to the brain—enabling us to position sounds very accurately in three-dimensional space. SRS technology essentially mimics the effects of the pinna by extracting information from a recording that originally came from the sides and rear in the original performance. SRS then uses HRTF-based frequency response corrections to cause the ear to perceive these sounds in their original spatial relationships. The result is a dramatically enhanced sense of audio realism.

NuReality™
To order, or for more information, call
1-800-501-8086

MasterCard VISA

Retail Vision · Multimedia World ★★★★½ · Innovations · Innovations

"I could not believe my ears...all I can do is enjoy it and stop wondering how it was done."
Audio Magazine**

*This specially recorded CD recreates the experience of 3D sound from any CD player. The demo CD is available for a $5.95 shipping and handling charge which can [illegible] applies only to Vivid 3D products purchased directly from NuReality. International orders do not include freight charges, duty or VAT. This specially recorded CD recreates the experience of 3D sound from any CD player. **Quote excerpted from a review of the Vivid 3D Plus in the December 20, 1994 issue of *PC Magazine*. Quote excerpted from a review of the SRS technology in the April 1992 issue of *Audio* Magazine. The Vivid 3D sound enhancement system won the Retail Vision "Best Product" award in May 1994, and the Innovations award from the International Consumer Electronics Show (CES) in June 1994. The Vivid 3D Pro won the Innovations award from CES in January 1995. SRS (●) is a registered trademark of SRS Labs. All product names are trademarks or registered trademarks of their respective holders. © 1995 NuReality. All rights reserved. PCMAG 3/95

CIRCLE 232 ON READER SERVICE CARD

See.

It's that simple.

Just open these colorfully illustrated guide-books and watch the answers to your software questions unfold.

The How To Use books from Ziff-Davis Press make computing easy by presenting each task visually on two facing pages. You'll see what you want to achieve, and exactly how to achieve it.

There's no guess work. No need to plow through page after page of the other computer books. No need to wait for what seems like an eternity for your turn on the technical support hotline. No need to ask for yet another favor from your local computer expert.

The How To Use books are the affordable alternative for those of us who would rather let the computer do the work.

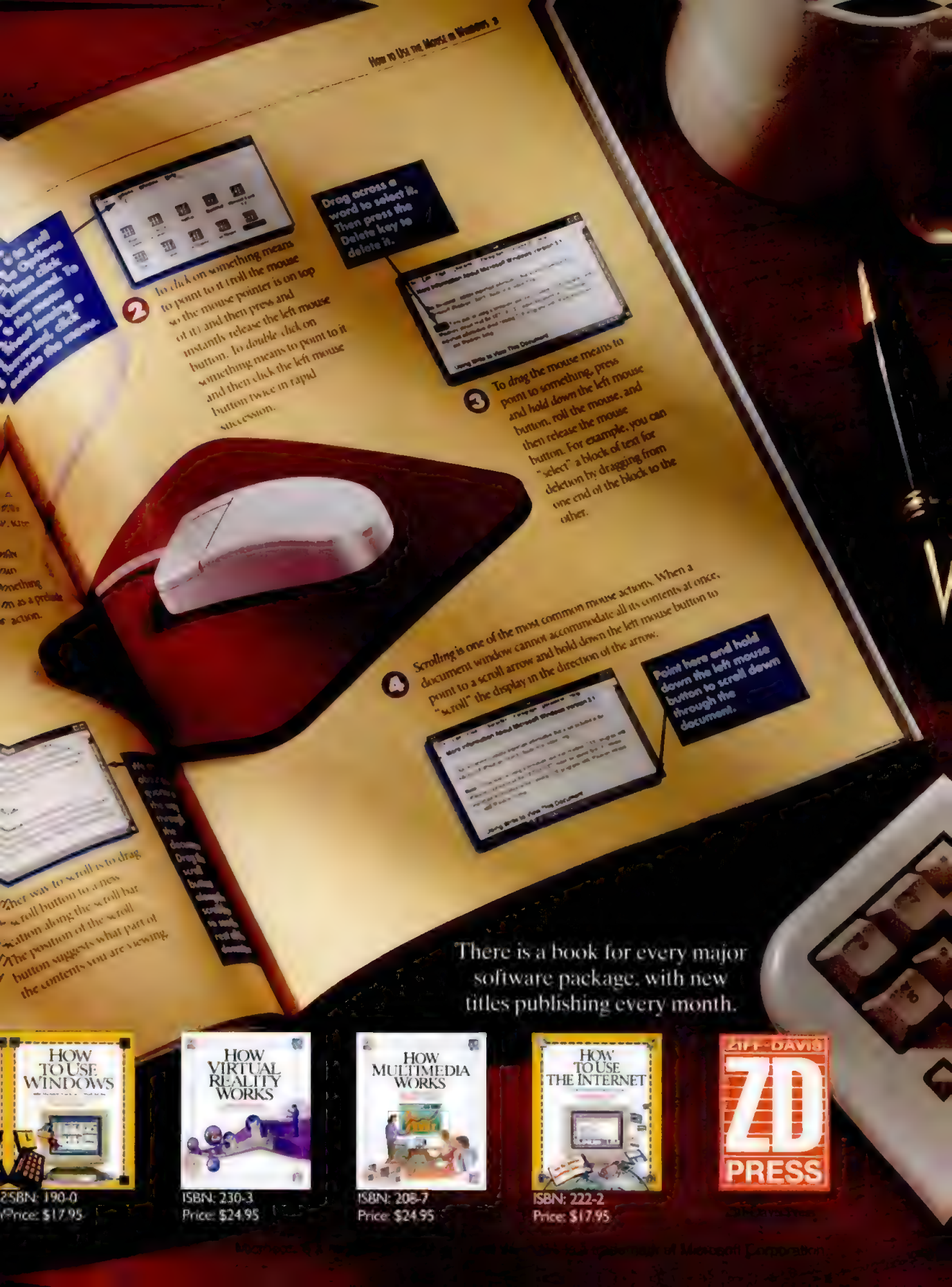
Seeing is believing. If you see yourself taking advantage of the power and ease of today's technology, see the How To Use series at your local bookstore, or call us at

1-800-688-0448,

ext. 259 for more information.

ISBN: 184-6
Price: $17.95

ISBN: 185-4
Price: $17.95


How to Use the Mouse in Windows 3
2 To click on something means to point to it (roll the mouse so the mouse pointer is on top of it) and then press and instantly release the left mouse button. To double click on something means to point to it and then click the left mouse button twice in rapid succession.
Drag across a word to select it. Then press the Delete key to delete it.
3 To drag the mouse means to point to something, press and hold down the left mouse button, roll the mouse, and then release the mouse button. For example, you can "select" a block of text for deletion by dragging from one end of the block to the other.
4 Scrolling is one of the most common mouse actions. When a document window cannot accommodate all its contents at once, point to a scroll arrow and hold down the left mouse button to "scroll" the display in the direction of the arrow.
Point here and hold down the left mouse button to scroll down through the document.
There is a book for every major software package, with new titles publishing every month.
HOW TO USE WINDOWS
ISBN: 190-0
Price: $17.95
HOW VIRTUAL REALITY WORKS
ISBN: 230-3
Price: $24.95
HOW MULTIMEDIA WORKS
ISBN: 208-7
Price: $24.95
HOW TO USE THE INTERNET
ISBN: 222-2
Price: $17.95
ZIFF-DAVIS
ZD PRESS

Advertising Sales Staff

One Park Avenue,
New York, NY 10016
212 503-5100

DISPLAY ADVERTISING

Dan Rosensweig - Publisher
(212) 503-5354
Nancy Newman - National Associate Publisher
(212) 503-4453
Bill Stephen
National Sales Manager
(212) 503-5626
Ad Coordination Supervisor
Julie Eigo
(212) 503-5107
Advertising Coordinator

NETWORK EDITION

Karla Spormann - Publisher/ Network Edition
(415) 378-5565

Kimberly White - Eastern Advertising Manager/ Network Products - Eastern Region & Midwest
(617) 393-3056
Account Representative
Andrew Zeiger
(212) 503-5162
Michael Klein- Western Advertising Manager Network Products- Western Region & Southwest
(415) 378-5521
Account Representative
Jeff Green
(212) 503-5129

Kimberly White - New England Area Manager
(617) 393-3056

MA, NH, VT, ME, RI, Canada

District Sales Manager
Tim Castelli (617) 393-3058
10 President's Landing, Mystic Center
Medford, MA 02155
(617) 393-3055
Account Representative
Kirk McDonald
(212) 503-5970

Frank Quigley- Atlantic Area Manager
(404) 814-8950

CT, NY, NJ, PA

District Sales Manager
Todd Anderman (212) 503-5149
One Park Avenue, 4th Floor
New York, NY 10016
(212) 503-5100
Account Representative
Elizabeth Cusick
(212) 503-5112

DE, MD, DC, VA, WV, NC, SC, AL,MS, TN, AR, KY, GA, FL

District Sales Manager
Marge Bonomo (404) 814-8992
3405 Piedmont Road NE, Suite 460
Atlanta, GA 30305
(404) 814-8940
Account Representative
Lynn Bader
(212) 503-5032

Ken Beach - Central Area Manager
(312) 214-7330

NE, WI, IL, IN, KS, MN, MO, MI, IA, ND, SD, OH

District Sales Manager
Tim Colby (312) 214-7353
150 North Wacker Drive, 25th Floor
Chicago, IL 60606
(312) 214-7300
Account Representative
Carolyn Goldfarb
(212) 503-5011

TX, OK, LA, NM

District Sales Manager
Claire Flora (214) 360-5725
5956 Sherry Lane, Suite 625
Dallas, TX 75225
(214) 360-5700
Felicia Carty
Account Representative
(212) 503-5675

Mark Malloy - Southwest Area Manager
(310) 268-1331

CA (Los Angeles), AZ

District Sales Manager
Julie York (310) 268-1381
11766 Wilshire Blvd., Suite 1550
Los Angeles, CA 90025
(310) 268-1300
Account Representative
R.J. Kirkland
(212) 503-5113

CA (San Diego & Orange County), HI

Senior District Sales Manager
Robin Kofsky (714) 852-5920
18301 Von Karmen Avenue, Suite 330
Irvine, CA 92715
(714) 852-5914
Account Representative
Elizabeth O'Connor
(212) 503-5040

Mike Kisseberth - West Coast Advertising Director
(415) 378-5510

CA (San Jose), ID

District Sales Manager
Owen Van Natta (415) 378-5527
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5500
Account Representative
Wendy Nathan
(212) 503-5024

CA (San Francisco & North), OR, WA, NV

District Sales Manager
Ira Becker (415) 378-5523
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5500
Account Representative
Dan Simon
(212) 503-5047

CA (South San Francisco to Mountainview), CO, UT, WY, AK, MT

Senior District Sales Manager
Kristy Newton (415) 378-6859
110 Marsh Drive, Suite 103
Foster City, CA 94404
(415) 378-5500
Account Representative
Jon Schwartz
(212) 503-5125

For more information regarding *display* advertising please call:
212 503-5100
1-800-33MAG AD

CENTRAL ADVERTISING

VP, Central Advertising
Robert A. Bader

Director of Sales and Marketing
Paul Fusco

Sales Manager
Monte Wasch

Production Director
Vicki Egan

Sr. Production Coordinator
Eileen Convery

Sr. Production Coordinator
Berhan Asmarom
Advertising Coordinator
Audie Marie Tinoso

CO, ID, KS, MN, MT, ND, NE, NV, OR, SD, UT, WA, WY, AK

Account Manager
Maggie Hewit
(212) 503-5156

AL, AR, FL, GA, LA, MS, NC, SC, TN, TX, WV, KY

Account Representitive
(212) 503-5171

AZ, CA (213, 310, 619, 714, 805, 818, 909), NM, OK, HI

Account Manager
John Burke
(212) 503-5076

CT, IA, IL, IN, ME, MI, NH, JN, MI, RI, VT, WI, MA, NJ, PA

Account Representative
Beth Kanner
(212) 503-5193

CA (209, 408, 415, 510, 707, 916)

Account Representative
Elisabeth Drumm
(212) 503-5118

DC, NY, DE, MD, OH, MO, VA, CN, Foreign

Acount Representative
Charysse Nuñez
(212) 503-5150

Business Card Advertising
Call: 1-800-825-4237
PC Magazine Marketplace
3rd Floor, One Park Ave.
New York, NY 10016

For more information regarding *central* advertising please call:
212 503-5115
1-800-825-4237

Advertisers' Index

COMPANIES

Reader Service No.	Advertiser	Page
874	3 Com Corporation	186-187
034	Acer America	77-81
273	Acer America	390-392
117	Adaptec	158
934	Adaptec	NE15
226	ADI Systems Inc	45
249	AEC Software	251
196	Alpha Software Corporation	144-145
*	America Online, Inc	403-404
162	American Power Conversion	409
025	American Small Business Computers	344
*	AMS	348-349
336	Arlington Computer Products	312-313
902	Asante Technologies	NE16
122	AST Research	52-53
309/233	AT&T Paradyne	269
323/241	AT&T Paradyne	278
*	AT&T	113-115
915	AT&T	NE18
127	ATI Technologies Inc	261
012	Austin Direct	132-135
873	Beame & Whiteside	NE35
287	Borland International	246
913	C E Software	NE9
292	Caere Corporation	6
245	Caere Corporation	265
*	Canon Computer Systems	64-65
258	Canon	226-227
073	Colorado Memory Systems	239
*	Communication Intelligence	76
137	Compaq Computer Corporation	70-73
*	Compaq Computer Corporation	106-107
*	Compaq Computer Corporation	215
*	Compaq Computer Corporation	270
126	CompuAdd	190-191
144	CompUSA Direct	206-207
348	Computer Associates	20-21
400	Computer Associates	28
109	COMPUTER DISCOUNT WAREHOUSE	317
159	COMPUTER DISCOUNT WAREHOUSE	318-319
360	COMPUTER DISCOUNT WAREHOUSE	320-321
158	Computer Library	354
316	Comtrade	305
020	Corel Corporation	232
011	Corel Corporation	281
851	DataRace, Inc	NE26
935	Datastorm Technologies	252
*	Dell Computer Corporation	C5-C8
*	Dell Computer Corporation	429-432
050	Delphi Internet Services	417
250	Delrina Technology	118
912	Delrina Technology	NE21
*	Epson America	10-11
243	File ABC	202
272	First Source International	327
014	First Source International	328-329
089	FOSA Computer Inc	343
861	FTP Software Inc	NE28
*	Gateway 2000	121-129
*	Gateway 2000	209-212
*	General Motors	84
247	Genoa Systems	399
391/138	H.Co Memory Upgrades	307
*	Hewlett Packard	57-59
170	Hyundai Electronics America	67
*	IBM Corporation	143
*	IBM Corporation	162-165
227	IBM Corporation	203
*	IBM PC Corporation	254
*	Infolmaging	98-99
219	Insight Direct	352-353
027	Insight Direct	388
*	Intel Corporation	14-15
*	Intel Corporation	222-223
*	Intel Corporation	NE11
876	J & L Information Systems	NE37
262	Keytronic Inc	109
106	Kingston Technology	143
251	Kye International	397
019	L.A. Trade	332
182	Logitech	396
*	Lotus Development Corporation	33-36
*	Lotus Development Corporation	194
*	Lotus Development Corporation	204
253	Mag Innovision	272
291	MapInfo Corporation	18
124	Matrox, Inc	266
018	MegaHaus	351
855	Micro Solutions Computer Products	326
862	Microcom	229
361	Micrografx	149
164	Micron Computer, Inc	179-184
203	Micron Computer, Inc	324
*	Microsoft	2-3
*	Microsoft	216-217
*	Microsoft	230-231
*	Microsoft	NE12-NE13
091	Microtek	406
010	Midwest Computer Works	340-341
398	Midwest Micro	294-302
329	Mitra	325
177	MPC Technology, Inc	330-331
*	Nanao Corporation	96
157	NEC Technologies	16-17
153	NEC Technologies	C2-C4,p1
217	NEC Technologies	138
908	NEC Technologies	NE22-NE23
877	NetManage, Inc	NE7
*	Nokia	23
346	Norton Lambert	41
*	Novell, Inc	NE2-NE3
*	NRI/McGraw Hill	407
259	Number Nine Computer Corporation	156
232	NuReality	419
*	Okidata	201
*	Oracle Corp	NE30-NE31
*	PC Connection	338-339
080	PC Power & Cooling	94
092	PCs Compleat	333
268	PCs Compleat	334-335
393	Peachtree Software	219
024	PerComp Microsystems, Inc	310-311
053	PerComp Microsystems, Inc	315
867	Performance Technology	NE42
098	Pinnacle Micro	43
899	Plaintree Systems	NE25
345	Powersoft Corporation	192
148	Primavera Systems	60
067	Princeton Graphics Systems	306
*	Prodigy Services Co	153-154
257	Profound Inc	257
929	Proteon Inc	NE32
*	QMS	289
230	Radius/rPC	90
046	Samsung Electronics America	258
278	Samsung	322-323
256	SCEPTRE Technologies	398
*	Scitor Corporation	55
399	Sigma Designs, Inc	401
248	Simple Technology	92
028	Spry, Inc	225
043	SPSS, Inc	309
909	Standard Microsystems Corporation	NE5
081	Sunshine Computers	345
183	Supra Corporation	413
186	Symantec Corporation	167
911	Symantec Corporation	169
344	Symantec Corporation	262
906	Symantec Corporation	285
184	Teac Corp. of America	221
001	Tektronix Inc	26-27
353	Texas Instruments	100-101
261	The Los Angeles Times	236A-236B
171	Timex	74
379	Toshiba America	198-199
*	US Robotics Inc	5
210	USA Flex	336-337
118	View Sonic	172-173
*	Visio	136-137
263	Visioneer Communications	13
373	Visual Software	415
237	Western Digital	68
167	Western Digital	287
085	WinBook Computer Corporation	63
864	Wollongong Group	NE38
*	Word Perfect/Novell Applications	82
942	Xerox Corporation	240
916	Xerox Corporation	282
*	Zenith Data Systems	86-87
151	Zeos Int'l	24-25
125	Zeos Int'l	88
155	Zeos Int'l	48A-48F

* No Reader Service #. Please Call Advertiser For Information.

Advertisers' Index
PRODUCTS

Reader Service No.	Company	Product	Page
ACCELERATOR BOARDS			
•	Intel Corporation	Overdrive Processor Upgrades	222-223
124	Matrox, Inc.	Impressions Plus	266
258	Number Nine Computer Corporation	9FX Introduction	56
230	Radius/rPC	Video Accelerator Boards	90
167	Western Digital	Paradise	287
ACCOUNTING SOFTWARE			
393	Peachtree Software	First Accounting	219
ADD-ON BOARDS			
247	Genoa Systems	Graphic Boards	399
391/138	H.Co Memory Upgrades	Memory, PCMCIA	307
124	Matrox, Inc	Impressions Plus	266
BACKUP SOFTWARE			
855	Micro Solutions Computer Products	Tape Backup	326
BRIDGES/ROUTERS/GATEWAYS			
902	Asante Technologies	10T Hubs	NE16
CAD/CAM			
025	American Small Business Computers	Design CAD 2D	344
CD-ROM			
158	Computer Library	Computer Select	354
014	First Source International	Memory, Software, Notebooks	328-329
219	Insight Direct	CDROM	352-353
027	Insight Direct	CDROM	388
855	Micro Solutions Computer Products	CDROM	326
232	NuReality	3D Sound Enhancement	419
278	Samsung	CDROM	322-323
184	Teac Corp. of America	Combo CD ROM/Floppy	221
CHIPS/PROCESSORS			
014	First Source International	Memory, Software, Notebooks	328-329
391/138	H.Co Memory Upgrades	Memory, PCMCIA	307
•	Intel Corporation	Intel Pentium Processor	14-15
•	Intel Corporation	Overdrive Processor Upgrades	222-223
106	Kingston Technology	Memory	143
019	L.A. Trade	Memory	332
COMMUNICATIONS SOFTWARE			
915	AT&T	Passageway Solutions	NE18
835	Datastorm Technologies	ProComm Plus for Windows	252
250	Delrina Technology	Win Fax 4.0	118
912	Delrina Technology	WinFax Pro For Networks	NE21
861	FTP Software Inc	Explore on Net	NE28
•	Infolmaging	3D Fax	98-99
862	Microcom	Modems	229
877	NetManage, Inc.	Chameleon 4.0	NE7
028	Spry, Inc	Internet-In-Box	225
906	Symantec Corporation	pcAnywhere	285
864	Wollongong Group	Pathway Access 4.0	NE38
COMPUTERS/COMPATIBLES			
034	Acer America	PCs and Notebooks	77-81
273	Acer America	OOBE	390-392
336	Arlington Computer Products	Mail Order, Peripherals	312-313
122	AST Research	Notebook Computers	52-53
•	AT&T	AT&T GIS PCs with Shareware	113-115
012	Austin Direct	Austin Desktops	132-135
137	Compaq Computer Corporation	Desktops	70-73
•	Compaq Computer Corporation	XE/XL, Contura, Elite	106-107
128	CompuAdd	CompuAdd Desktops & Notebooks	190-191
144	CompUSA Direct	Mail Order	206-207
109	COMPUTER DISCOUNT WAREHOUSE	Hardware	317
159	COMPUTER DISCOUNT WAREHOUSE	Hardware	318-319
360	COMPUTER DISCOUNT WAREHOUSE	Hardware	320-321
316	Comtrade	System	305
•	Dell Computer Corporation	Dell Desktops & Notebooks	C5-C8
•	Dell Computer Corporation	Dell Desktops & Notebooks	429-432
089	FOSA Computer Inc	Portables	343
•	Gateway 2000	PCs	121-129
•	Gateway 2000	PCs	209-212
•	Hewlett Packard	HP Vectra PCs	57-59
•	IBM Corporation	Desktops	162-165
227	IBM Corporation	PCs	203
219	Insight Direct	Mail Order Systems	352-353
027	Insight Direct	Mail Order Systems	388
•	Intel Corporation	Intel Pentium Processor	14-15
164	Micron Computer, Inc	Micron PCs	179-184
010	Midwest Computer Works	PCs, Hardware	340-341
358	Midwest Micro	Desktop Systems	294-302
092	PCs Compleat	Mail Order	333
268	PCs Compleat	Mail Order	334-335
024	PerComp Microsystems, Inc	Mail Order	310-311
053	PerComp Microsystems, Inc	Mail Order	315
278	Samsung	Mail Order Systems	322-323
171	Timex	Timex Computer Watch	74
379	Toshiba America	Notebook Computers	198-199
210	USA Flex	Desktop PCs	336-337
•	Zenith Data Systems	Z-Noteflex/Multimedia	86-87
125	Zeos Int'l	Pentium Pantera Line	88
155	Zeos Int'l	Zeos Pantera Pentium PCs	48A-48F
DATA BASE MANAGERS			
196	Alpha Software Corporation	Alpha Software	144-145
287	Borland International	Delphi	246
400	Computer Associates	Visual Objects	28
361	Micrografx	ABC Flowcharter	149
•	Oracle Corp	Workgroup Server	NE30-NE31
DESK TOP PUBLISHING			
020	Corel Corporation	Ventura 5.0	232
011	Corel Corporation	Gallery	281
DIAGNOSTIC SOFTWARE			
344	Symantec Corporation	Win 95 Preview	252
DISK BACKUP & TAPE DRIVES			
018	MegaHaus	Drives/Storage	351
855	Micro Solutions Computer Products	Tape Backup, Disk Drives	326
DISPLAYS/MONITORS			
228	ADI Systems Inc	Monitors	45
272	First Source International	Notebooks, Memory, Peripherals	327
170	Hyundai Electronics America	Monitors	67
253	Mag Innovision	Mag Innovision Monitors	272
010	Midwest Computer Works	Monitors	340-341
•	Nanao Corporation	Monitors	96
157	NEC Technologies	Monitors	16-17
•	Nokia	Monitors	23
067	Princeton Graphics Systems	Princeton Graphics Monitors	306
046	Samsung Electronics America	Monitors	258
256	SCEPTRE Technologies	LCD Monitor	398
118	View Sonic	Monitors	172-173
EDUCATIONAL SOFTWARE			
•	NRI/McGraw Hill	Computer Training	407
ELECTRONIC MAIL			
877	NetManage, Inc.	Chameleon 4.0	NE7
ENTERTAINMENT SOFTWARE			
011	Corel Corporation	Gallery	281
FAX SOFTWARE			
835	Datastorm Technologies	ProComm Plus for Windows	252
•	Infolmaging	3D Fax	98-99
263	Visioneer Communications	PaperPort	13
FAX/MODEM			
309/233	AT&T Paradyne	Dataport Modems	269
323/241	AT&T Paradyne	Kit & Kit Express	278
851	DataRace, Inc	WinMax Combo Card	NE26
272	First Source International	Notebooks, Memory, Peripherals	327
014	First Source International	Memory, Software, Notebooks	328-329
061	Sunshine Computers	Notebooks/Laptops	345
FILE SYSTEMS & ACCESS METHODS			
•	Infolmaging	3D Fax	98-99
FLOPPY DISK DRIVES			
184	Teac Corp. of America	Combo CD ROM/Floppy	221
FLOWCHARTING			
361	Micrografx	ABC Flowcharter	149
•	Visio	Visio Graphics Software	136-137
GRAPHICAL INTERFACE			
273	Acer America	OOBE	390-392
GRAPHICS SOFTWARE			
252	Caere Corporation	OmniPage	5
245	Caere Corporation	PageKeeper	265
011	Corel Corporation	Gallery	281
•	Nanao Corporation	Monitors	96
217	NEC Technologies	Multimedia Theatre	138
•	Visio	Visio Graphics Software	136-137
373	Visual Software	Visual Reality	415
HARD DRIVES			
219	Insight Direct	Hard Drives	346-347
027	Insight Direct	Hard Drives	388
855	Micro Solutions Computer Products	Disk Drive	326
278	Samsung	Hard Drives	322-323
237	Western Digital	Caviar	68
HARDWARE			
874	3 Com Corporation	PCI Adapters	186-187
309/233	AT&T Paradyne	Dataport Modem	269
323/241	AT&T Paradyne	Kit & Kit Express	278
•	Canon Computer Systems	BJC 4000 Printer	64-65
144	CompUSA Direct	Mail Order	206-207
316	Comtrade	Systems	305
851	DataRace, Inc	WinMax Combo Card	NE26
•	Intel Corporation	Intel Pentium Processor	14-15
•	Intel Corporation	Overdrive Processor Upgrades	222-223
876	J & L Information Systems	Remote Access Server	NE37
106	Kingston Technology	Memory	143
251	Kye International	Flatbed Scanner	397
018	MegaHaus	Drives/Storage	351
091	Microtek	Scanners	406
358	Midwest Micro	Notebooks,Desktops,Peripherals	294-302
329	Micro	Notebooks	325
157	NEC Technologies	Monitors	16-17
232	NuReality	3D Sound Enhancement	419
899	Plantree Systems	WaveSwitch	NE25
929	Proteon Inc.	Ethernet Family	NE32
256	SCEPTRE Technologies	LCD Monitor	398
248	Simple Technology	PC Cards	92
184	Teac Corp. of America	Combo CD ROM/Floppy	221
118	View Sonic	Monitors	172-173
263	Visioneer Communications	PaperPort	13
HUBS			
929	Proteon Inc.	Ethernet Family	NE32
IMAGE EDITING SOFTWARE			
251	Kye International	Flatbed Scanner	397
INFORMATION MANAGERS			
•	Lotus Development Corporation	Organizer	194
345	Powersoft Corporation	InformationManagement Software	192
INPUT DEVICES			
•	Communication Intelligence	Handwriter for Windows	76
252	Keytronic Inc.	Windows 95 Keyboards	109
182	Logitech	Mouseman Cordless	396
263	Visioneer Communications	PaperPort	13
INTEGRATED SOFTWARE			
•	Lotus Development Corporation	Notes/Suite	33-36
LAN ADAPTER BOARDS			
874	3 Com Corporation	PCI Adapters	186-187
117	Adaptec	SCSI Adapter/PCI Pentium	156
934	Adaptec	SCSI Adapter	NE15
851	DataRace, Inc	WinMax Combo Card	NE26
•	Intel Corporation	Pro 100 Adapters	NE11
LANGUAGES			
186	Symantec Corporation	C++	167
LAPTOPS/PORTABLE COMPUTERS			
034	Acer America	PCs and Notebooks	77-81
•	AMS	Notebooks	348-349
122	AST Research	Notebook Computers	52-53
012	Austin Direct	Austin Notebooks	132-135
•	Compaq Computer Corporation	XE/XL, Contura, Elite	106-107
•	Compaq Computer Corporation	LTE Elite	215
•	Compaq Computer Corporation	Contura Direct	270
128	CompuAdd	CompuAdd Desktops & Notebooks	190-191
144	CompUSA Direct	Mail Order	206-207
109	COMPUTER DISCOUNT WAREHOUSE	Laptops	317
159	COMPUTER DISCOUNT WAREHOUSE	Laptops	318-319
360	COMPUTER DISCOUNT WAREHOUSE	Laptops	320-321
•	Dell Computer Corporation	Dell Desktops & Notebooks	C5-C8
•	Dell Computer Corporation	Dell Desktops & Notebooks	429-432

Advertisers' Index

PRODUCTS

Reader Service No.	Company	Product	Page
272	First Source International	Notebooks, Memory, Peripherals	327
089	FOSA Computer Inc	Portables	343
•	Gateway 2000	Notebooks	121-129
•	Gateway 2000	Notebooks	209-212
•	Hewlett Packard	OmniBook 600, OmniBook 4000	57-59
•	IBM Corporation	Thinkpad	162-165
010	Midwest Computer Works	PCs, Hardware	340-341
398	Midwest Micro	Notebooks	294-302
329	Mitra	Notebooks	325
177	MPC Technology, Inc	MultiMedia Notebooks	330-331
153	NEC Technologies	NEC Versa Notebooks	C2-C4,p1
081	Sunshine Computers	Notebooks/Laptops	345
353	Texas Instruments	TI Notebooks	100-101
378	Toshiba America	Notebook Computers	198-199
210	USA Flex	Notebooks	336-337
085	WinBook Computer Corporation	Winbook	63
•	Zenith Data Systems	Z-Noteflex/Multimedia	86-87
151	Zeos Int'l	Meridian Color Notebooks	24-25

LOCAL AREA NETWORKING

874	3 Com Corporation	PCI Adapters	186-187
913	C E Software	Time Vision Network Scheduler	NE9
348	Computer Associates	Unicenter	20-21
109	COMPUTER DISCOUNT WAREHOUSE	Networking Products	317
159	COMPUTER DISCOUNT WAREHOUSE	Networking Products	318-319
360	COMPUTER DISCOUNT WAREHOUSE	Networking Products	320-321
912	Delmia Technology	WinFax Pro for Networks	NE21
861	FTP Software Inc	Explore on Net	NE28
•	Intel Corporation	Pro 100 Adapters	NE11
876	J & L Information Systems	Remote Access Server	NE37
862	Microcom	Modems	229
908	NEC Technologies	Servers	NE22-NE23
•	Novell, Inc	Novell Netware 4.1	NE2-NE3
867	Performance Technology	Instant Internet	NE42
899	Plantree Systems	WaveSwitch	NE25
248	Simple Technology	PC Cards	92
911	Symantec Corporation	Enterprise Developer	169
942	Xerox Corporation	4500 Network Laser	240
916	Xerox Corporation	4900 Printer	282

MAIL ORDER

034	Acer America	PCs and Notebooks	77-81
•	AMS	Notebooks	348-349
336	Arlington Computer Products	Mail Order, Peripherals	312-313
•	AT&T	AT&T GIS PCs with Shareware	113-115
012	Austin Direct	Austin Desktops & Notebooks	132-135
•	Compaq Computer Corporation	XE/XL, Conutra, Elite	106-107
•	Compaq Computer Corporation	LTE Elite	215
•	Compaq Computer Corporation	Contura Direct	270
126	CompuAdd	CompuAdd Desktops & Notebooks	190-191
144	CompUSA Direct	Mail Order	206-207
109	COMPUTER DISCOUNT WAREHOUSE	Hardware, Networking Products	317
159	COMPUTER DISCOUNT WAREHOUSE	Hardware, Networking Products	318-319
360	COMPUTER DISCOUNT WAREHOUSE	Hardware, Networking Products	320-321
316	Comtrade	Systems	305
•	Dell Computer Corporation	Dell Desktops & Notebooks	C5-C8
•	Dell Computer Corporation	Dell Desktops & Notebooks	429-432
014	First Source International	Memory, Software, Notebooks	328-329
089	FOSA Computer Inc	Portables	343
•	Gateway 2000	Mail Order	121-129
•	Gateway 2000	Mail Order	209-212
391/138	H Co Memory Upgrades	Memory, PCMCIA, Fax/Modem, LAN	307
•	IBM Corporation	Thinkpad & Desktops	162-165
010	Midwest Computer Works	Mail Order	340-341
329	Mitra	Notebooks	325
•	PC Connection	Mail Order	338-339
092	PCs Compleat	Mail Order	333
268	PCs Compleat	Mail Order	334-335
024	PerComp Microsystems, Inc	Mail Order	310-311
053	PerComp Microsystems, Inc	Mail Order	315
256	SCEPTRE Technologies	LCD Monitor	398
081	Sunshine Computers	Notebooks/Laptops	345
210	USA Flex	Notebooks, PCs, Peripherals	336-337
151	Zeos Int'l	Meridian Color Notebooks	24-25
125	Zeos Int'l	Pentium Pantera Line	88
155	Zeos Int'l	Zeos Pantera Pentium PCs	48A-48F

MAPPING SOFTWARE

291	MapInfo Corporation	Desktop Mapping Software	18

MASS STORAGE

073	Colorado Memory Systems	Mass Storage	239
018	MegaHaus	Drives/Storage	351

MEMORY

272	First Source International	Notebooks, Memory, Peripherals	327
014	First Source International	Memory, Software, Notebooks	328-329
391/138	H Co Memory Upgrades	Memory	307
106	Kingston Technology	Memory	143
019	L.A. Trade	Memory	332
203	Micron Computer, Inc	Micron Memory	324

MISCELLANEOUS

•	General Motors	Corporate Ad	84
005	Micro Solutions Computer Products	Tape Backup,Disk Drives,CDROM	326
•	NRI/McGraw Hill	Computer Training	407
171	Timex	Timex Computer Watch	74

MODEMS

309/233	AT&T Paradyne	Dataport Modems	269
323/241	AT&T Paradyne	Kit & Kit Express	278
851	DataRace, Inc	WinMax Combo Card	NE26
862	Microcom	Modems	229
248	Simple Technology	PC Cards	92
183	Supra Corporation	Modems	413
•	US Robotics Inc	Sportster V.34	5

MULTI-MEDIA

316	Comtrade	Systems	305
247	Genoa Systems	Graphic Boards	399
219	Insight Direct	MultiMedia	352-353
027	Insight Direct	MultiMedia	388
018	MegaHaus	Drives/Storage	351
177	MPC Technology, Inc	MultiMedia Notebooks	330-331
157	NEC Technologies	Monitors	16-17
259	Number Nine Computer Corporation	9FX Introduction	156
232	NuReality	3D Sound Enhancement	419
278	Samsung	MultiMedia	322-323
399	Sigma Designs, Inc	Video Capture Boards	401
248	Simple Technology	PC Cards	92
184	Teac Corp. of America	Combo CD ROM/Floppy	221
118	View Sonic	Monitors	172-173

MULTIMEDIA SOFTWARE

011	Corel Corporation	Gallery	281
373	Visual Software	Visual Reality	415

Reader Service No.	Company	Product	Page

NETWORK INTERFACE CARDS

•	Intel Corporation	Pro 100 Adapters	NE11
929	Proteon Inc	Ethernet Family	NE32
908	Standard Microsystems Corporation	Fast Ethernet Cards	NE5

NETWORKING SOFTWARE

913	C E Software	Time Vision Network Scheduler	NE9
348	Computer Associates	Unicenter	20-21
861	FTP Software Inc	Explore on Net	NE28
•	IBM Corporation	OS/2 Warp	47
•	Novell, Inc	Novell Netware 4.1	NE2-NE3
•	Oracle Corp	Workgroup Server	NE30-NE31
867	Performance Technology	Instant Internet	NE42
911	Symantec Corporation	Enterprise Developer	169
344	Symantec Corporation	Win 95 Preview	262

OCR PRODUCTS

243	File ABC	File ABC	202
251	Kye International	Flatbed Scanner	397
263	Visioneer Communications	PaperPort	13

ON LINE DATABASE

•	America Online, Inc	America Online	403-404
050	Delphi Internet Services	Internet Mail Gateway	417
•	Prodigy Services Co	Prodigy On Line Services	153-154
257	Profound Inc	MAID	257
028	Spry, Inc	Internet-In-Box	225
261	The Los Angeles Times	On-Line Services	236A-236B

OPERATING SYSTEMS

•	Novell, Inc	Novell Netware 4.1	NE2-NE3

OPTICAL PERIPHERALS

018	MegaHaus	Drives/Storage	351
217	NEC Technologies	Multimedia Theatre	138
098	Pinnacle Micro	Optical Drives	43

ORGANIZATIONAL SOFTWARE

243	File ABC	File ABC	202
•	Visio	Visio Graphics Software	136-137

OS/2 SOFTWARE

•	IBM Corporation	OS/2 Warp	47

PC ACCESSORIES

232	NuReality	3D Sound Enhancement	419

PC DIRECT

025	American Small Business Computers	Design CAD 2D	344
•	AMS	Notebooks	348-349
336	Arlington Computer Products	Mail Order, Peripherals	312-313
109	COMPUTER DISCOUNT WAREHOUSE	Resellers	317
159	COMPUTER DISCOUNT WAREHOUSE	Resellers	318-319
360	COMPUTER DISCOUNT WAREHOUSE	Resellers	320-321
316	Comtrade	Systems	305
272	First Source International	Notebooks, Memory, Peripherals	327
014	First Source International	Memory, Software, Notebooks	328-329
391/138	H Co Memory Upgrades	Memory, PCMCIA, Fax/Modem, LAN	307
219	Insight Direct	Systems, Hard Drives, CDROM	352-353
027	Insight Direct	Systems, Hard Drives, CDROM	388
019	L.A. Trade	Memory	332
018	MegaHaus	Drives/Storage	351
855	Micro Solutions Computer Products	Tape Backup,Disk Drives,CDROM	326
398	Midwest Micro	Notebooks,Desktops,Peripherals	294-302
177	MPC Technology, Inc	MultiMedia Notebooks	330-331
•	PC Connection	Mail Order	338-339
092	PCs Compleat	Mail Order	333
268	PCs Compleat	Mail Order	334-335
024	PerComp Microsystems, Inc	Mail Order	310-311
053	PerComp Microsystems, Inc	Mail Order	315
278	Samsung	Systems, Hard Drives, CDROM	322-323
081	Sunshine Computers	Notebooks/Laptops	345
210	USA Flex	Notebooks, PCs, Peripherals	336-337

PCMCIA

391/138	H Co Memory Upgrades	Fax/Modem, Flash, SRAM, Drives	307
106	Kingston Technology	Memory	143
248	Simple Technology	PC Cards	92
•	US Robotics Inc	Sportster V.34	5

PERIPHERALS

874	3 Com Corporation	PCI Adapters	186-187
309/233	AT&T Paradyne	Dataport Modems	269
323/241	AT&T Paradyne	Kit & Kit Express	278
109	COMPUTER DISCOUNT WAREHOUSE	Peripherals	317
159	COMPUTER DISCOUNT WAREHOUSE	Peripherals	318-319
360	COMPUTER DISCOUNT WAREHOUSE	Peripherals	320-321
272	First Source International	Notebooks, Memory, Peripherals	327
•	Gateway 2000	Peripherals	121-129
•	Gateway 2000	Peripherals	209-212
219	Insight Direct	Peripherals	346-347
027	Insight Direct	Peripherals	388
398	Midwest Micro	Peripherals	294-302
232	NuReality	3D Sound Enhancement	419
278	Samsung	Peripherals	322-323

POWER PROTECTION

162	American Power Conversion	Back-UPS	409
080	PC Power & Cooling	PowerProtection/CoolingDevices	94

PRESENTATION SOFTWARE

251	Kye International	Flatbed Scanner	397
•	Microsoft	Microsoft Office	216-217

PRINTER ACCESSORIES

210	USA Flex	Peripherals, Printers	336-337

PRINTERS

258	Canon	Corporate Branding	226-227
•	Canon Computer Systems	BJC 4000 Printer	64-65
•	Epson America	Epson Printers	10-11
•	Okidata	OL410e	201
•	QMS	Magicolor Printer	289
081	Sunshine Computers	Notebooks/Laptops	345
001	Tektronix Inc	Tektronix Printers	26-27
210	USA Flex	Peripherals, Printers	336-337
942	Xerox Corporation	4500 Network Laser	240
916	Xerox Corporation	4900 Printer	282

PROGRAM DEVELOPERS

•	Microsoft	Visual C++ Cross Tools	NE12-NE13
186	Symantec Corporation	C++	157

PROGRAMMERS TOOLS UTILITIES

400	Computer Associates	Visual Objects	28
•	Microsoft	Visual C++ Cross Tools	NE12-NE13

Advertisers' Index
PRODUCTS

Reader Service No.	Company	Product	Page
345	Powersoft Corporation	InformationManagement Software	192
186	Symantec Corporation	C++	167
344	Symantec Corporation	Win 95 Preview	262
	PROJECT MANAGEMENT		
249	AEC Software	Fast Track Schedule	251
148	Primavera Systems	SureTrak	80
*	Scitor Corporation	Process Charter	55
	REMOTE COMPUTING		
876	J & L Information Systems	Remote Access Server	NE37
346	Norton Lambert	Close Up 6.0	41
344	Symantec Corporation	Win 95 Preview	262
806	Symantec Corporation	pcAnywhere	285
*	US Robotics Inc	Sportster V.34	5
	RENTALS/LEASING		
227	IBM Corporation	PCs	203
	RESELLERS		
010	Midwest Computer Works	Reseller	340-341
081	Sunshine Computers	Notebooks/Laptops	345
	SCANNERS		
251	Kye International	Flatbed Scanner	397
091	Microtek	Scanners	408
263	Visioneer Communications	PaperPort	13
	SERVERS		
*	IBM PC Corporation	Servers	254
908	NEC Technologies	Servers	NE22-NE23
	SERVICE/SUPPORT		
*	Microsoft	Microsoft Office	216-217
	SHAREWARE SOFTWARE		
*	AT&T	AT&T GIS PCs with Shareware	113-115
	SOFTWARE		
249	AEC Software	Fast Track Schedule	251
025	American Small Business Computers	Design CAD 2D	344
287	Borland International	Delphi	248
144	CompUSA Direct	Mail Order	206-207
348	Computer Associates	Unicenter	20-21
243	File ABC	File ABC	202
*	IBM Corporation	OS/2 Warp	143
219	Insight Direct	Software	352-353
027	Insight Direct	Software	388
*	Lotus Development Corporation	Organizer	194
*	Microsoft	Microsoft Excel	2-3
*	Microsoft	Microsoft Office	216-217
*	Microsoft	Microsoft Back Office	230-231
877	NetManage, Inc	Chameleon 4.0	NE7
346	Norton Lambert	Close Up 6.0	41
*	Novell, Inc	Novell Netware 4.1	NE2-NE3
393	Peachtree Software	First Accounting	219
278	Samsung	Software	322-323
043	SPSS, Inc	Statistical & Windows Software	309
186	Symantec Corporation	C++	167
911	Symantec Corporation	Enterprise Developer	169
806	Symantec Corporation	pcAnywhere	285
*	Visio	Visio Graphics Software	136-137
373	Visual Software	Visual Reality	415
	SPREADSHEET TEMPLATES		
*	Microsoft	Microsoft Excel	2-3
*	Microsoft	Microsoft Office	216-217
*	Word Perfect/Novell Applications	Quattro Pro	82
	STATISTICAL SOFTWARE		
043	SPSS, Inc	Statistical Software	309
	TCP/IP		
873	Beame & Whiteside	BW-Connect/BW MultiConnect	NE35
877	NetManage, Inc	Chameleon 4.0	NE7
864	Wollongong Group	Pathway Access 4.0	NE38
	TRAINING SOFTWARE		
*	NRI/McGraw Hill	Computer Training	407
	UTILITIES		
346	Norton Lambert	Close Up 6.0	41
344	Symantec Corporation	Win 95 Preview	262
	VIDEO GRAPHICS BOARDS		
127	ATI Technologies Inc	Mach 64-Bit Accelerator	261
124	Matrox, Inc	Impressions Plus	266
250	Number Nine Computer Corporation	9FX Introduction	156
230	Radius/rPC	Video Accelerator Boards	90
399	Sigma Designs, Inc	Video Capture Boards	401
	WINDOWS SOFTWARE		
249	AEC Software	Fast Track Schedule	251
025	American Small Business Computers	Design CAD 2D	344
913	C E Software	Time Vision Network Scheduler	NE9
*	Communication Intelligence	Handwriter for Windows	76
348	Computer Associates	Unicenter	20-21
400	Computer Associates	Visual Objects	28
020	Corel Corporation	Ventura 5.0	232
935	Datastorm Technologies	ProComm Plus for Windows	252
250	Delrina Technology	Win Fax 4.0	118
*	Lotus Development Corporation	Notes/Suite	33-36
361	Micrografx	ABC Flowcharter	149
*	Microsoft	Microsoft Excel	2-3
*	Microsoft	Microsoft Excel	2-3
*	Microsoft	Microsoft Office	216-217
877	NetManage, Inc	Chameleon	NE7
346	Norton Lambert	Close Up 6.0	41
393	Peachtree Software	First Accounting	219
148	Primavera Systems	SureTrak	80
*	Scitor Corporation	Process Charter	55
028	Spry, Inc	Internet-In-Box	225
043	SPSS, Inc	Windows Software	309
*	Visio	Visio Graphics Software	136-137
373	Visual Software	Visual Reality	415
864	Wollongong Group	Pathway Access 4.0	NE38
*	Word Perfect/Novell Applications	Quattro Pro	82
	WORD PROCESSING SOFTWARE/AIDS		
*	Communication Intelligence	Handwriter for Windows	76
	WORK GROUP SOFTWARE		
913	C E Software	Time Vision Network Scheduler	NE9
*	Lotus Development Corporation	Notes/Suite	33-36
*	Lotus Development Corporation	Lotus Notes	204

For Additional Categories See MARKETPLACE PRODUCT INDEX Page 355.

PC MAGAZINE

Coming Up

Pentium and Nx586 Desktops

Mainstream PC buyers face a new spectrum of alternatives. The 100-MHz Pentium processor is finally shipping in volume, and the 120-MHz chip is on its way—even as the 75-MHz version drives prices ever lower. There's a wildcard to consider, too: NexGen's Nx586 CPU series, which promises to match the Pentium's performance but at a lower price.

How do systems based on these CPUs stack up? Will it be the 75-, 90-, 100-, or 120-MHz Pentium that gives you the most bang for the buck? Can the Nx586 really meet its performance targets? We test over 100 Pentium- and Nx586-based PCs to find out. And we take a look at technology you can expect to see more of as the year goes by: improved connectivity features, new core-logic chip sets that boost performance, Plug and Play support, and more.

Life Imitates Chart

Today's flowcharting packages let you create flowcharts, organization charts, and diagrams with ease. Our evaluation focuses on the many tools available to design charts and schematics, including templates, palettes, symbols, automation and integration features, import and export support, and output controls. In a sidebar, we discuss those flowcharting packages expressly designed to create charts based on Total Quality Management and process management guidelines.

The Hidden Network

What good is a network if you can't use it? Not very much. That's why *PC Magazine* will take a hard look at the products that define how you interact with your network—the network operating systems. We'll test the leaders—Microsoft Windows NT Server 3.5, NetWare 3.12 and 4.1, OS/2 LAN Server 4.0 (Entry and Advanced), and VINES 5.54—and tell you which products the network manager and user will find the easiest and the hardest to use in this most critical component of your LAN.

Build a Better Interface

Microsoft Windows 95 complements the familiar controls—such as push buttons, list boxes, and edit windows—with 15 new controls. One of the most useful is the tooltip control, which lets developers add Word- and Excel-style tooltips to their applications. If you're a developer, now is a great time to get acquainted with the tooltip controls, especially if you're concerned about giving your application's user interface that extra edge. Our next Power Programming column introduces this new control and presents sample code that demonstrates its use.

Editorial Product Index

Reader Service No.	Product	Company	Page
424	ABC FlowCharter 4.0	Micrografx Inc.	44
412	Ability for Windows	Ability Plus Software	62
441	AcerAcros Pentium Minitower	Acer America Corp.	394
431	AnyTime for Windows, Version 3.0	Individual Software Inc.	66
442	AST Advantage! Adventure 6075p	AST Research Inc.	395
952	BBN Internet Server	BBN Internet Services Corp.	NE6
966	Berkshire PC Watchdog	Berkshire Products	NE33
407	Canon BJC-70 color printer	Canon Computer Systems	62
959	Combinet Everyware 2000	Combinet Inc.	NE29
958	DAX 3.0	Ram Research	NE29
434	Delphi	Borland International Inc.	37
401	Diamond Stealth 64 Pro Video VRAM	Diamond Multimedia Systems Inc.	42
456	Digital Road Map for Windows NT	Digital Equipment Corp.	208
963	EFI Fiery XJ	Electronics for Imaging Inc.	NE31
416	EZ-Menu 6.0	Progressive Computer Services Inc.	56
961	FAXserve 3.0	Cheyenne Software Inc.	NE29
403	Fed Ex Ship 1.0	Federal Express	54
420	First Accounting	Peachtree Software	54
443	Gateway 2000 P5-75 Family PC	Gateway 2000 Inc.	402
968	HP PowerWise UPS	Hewlett-Packard Co.	NE27
426	HP ScanJet 3c	Hewlett-Packard Co.	50
402	HSC InterActive 2.0	HSC Software	42
444	IBM Aptiva 730	IBM Personal Computer Co.	402
417	InfoSeek Search	InfoSeek Corp.	56
408	Inside the SAT	The Princeton Review Management Corp	61
953	IT Solutions Neticity Workstation	IT Solutions	NE10
429	Jakarta	Jazz Multimedia Inc.	37
965	LAN Inventory 3.2	McAfee Associates	NE33
969	LANtastic Utility Pack	Artisoft Inc.	NE19
404	LaserJet 5MP	Hewlett-Packard Co.	61
404	LaserJet 5P	Hewlett-Packard Co.	61
445	Leading Edge Fortiva Series 5000	Leading Edge Products Inc.	405
422	MetaStock for Windows	Equis International Inc.	48
446	Micron P90 Home MPC	Micron Computer Inc.	408
451	Microsoft Visual C++, Version 2.0: The Six-Volume Documentation Collection	Microsoft Press	69
	Microsoft Windows 95	Microsoft Corp.	102
457	Microsoft Windows NT Resource Kit	Microsoft Corp.	213
418	NamePro 1.01 for Windows	The NameStormers	56
447	NEC Ready 9510	NEC Technologies Inc.	410
957	Netaccess Multiport Modem Card	Xircom Inc.	NE29
458	NetPublisher	Ameritech Library Services Inc.	220
955	Netra i5 Internet Server	Sun Microsystems Computer Co.	NE17
956	NetWorth FastStack stackable hub system	NetWorth Inc.	NE29
962	ONET LANbooster 5000	ONET Data Communication Technologies	NE30
455	Open Mail System	Raindrop Software	271
960	Oracle Office 2.1	Oracle Corp.	NE30
452	OS/2 Warp Connect, Version 3	IBM Corp.	110
452	OS/2 Warp, Version 3	IBM Corp.	110
448	Packard Bell Multimedia Pentium	Packard Bell Inc.	411
410	Panasonic V41 Pentium/75	Panasonic Personal Computer Co.	66
450	PC MOM: The Mother of All PC Books	Addison-Wesley	69
419	PeopleScheduler Plus	Adaptiv Software Corp.	49
411	Picture Window, Version 1.1	Digital Light & Color Inc.	66
415	Portrait Pivot 1700	Portrait Display Labs	66
414	PowerMedia	RAD Technologies Inc.	66
409	Primax ColorMobile Office scanner	Primax Electronics	62
430	RealMagic Rave VLB	Sigma Designs Inc.	37
433	Sharp Zaurus ZR-5000	Sharp Electronics Corp.	40
954	Silicon Graphics WebForce	Silicon Graphics Inc.	NE14
453	SQA TeamTest, Version 3.0	SQA Inc.	271
964	TeamTalk 2.0	Trax Software Inc.	NE31
405	TextBridge Professional Edition 3.0	Xerox Corp.	61
967	3Com Fast Etherlink PCI 10/100	3Com Corp.	NE24
432	Toshiba Satellite Pro 2150CDT	Toshiba America Information Systems	40
425	Transcend 1.0	Intergraph Corp	46
427	UMAX PageOffice	UMAX Technologies Inc.	51
449	USA Flex PT-75 MultiMedia Classic	USA Flex	416
951	Vineyard, Version 1.1.1	Data Fellows Inc.	NE19
428	Visioneer PaperPort 2.0	Visioneer	51
423	VocalTec Internet Phone	VocalTec Inc.	48
421	WindowBASE 2.0	Software Products International Inc.	49
454	WinISDN SDK	ISDN*tek	271
413	WinSales, Version 3.0	WinSales Inc.	66
406	WinZip Self-Extractor	Nico Mak Computing Inc.	61

NE—Network Edition.
To obtain the Network Edition of *PC Magazine*, call Circulation at 800-289-0429.

Abort, Retry, Fail?

THE LIGHTER SIDE OF PERSONAL COMPUTING

By Don Willmott

Thanks for the Clarification, Bob; We Weren't Sure

"Q: Do I call Bob 'he' when referring to the product?

"A: No. Because it is a software product, 'it' is clearly the right way to refer to Bob, its features and its benefits."

—MICROSOFT BOB PRESS RELEASE

ALF on the road: Winnipeg, Manitoba, Canada.

Classified Intelligence

"Wanted to Buy: Doggie door for sliding glass door (puppy always wants out when I am right in the middle of complex data entry)."—*COMPUTORWORLD*

"For sale: Copier, Sharp, Commercial SF850, does 3 sides of paper, $99."—*THE ST. PETERSBURG TIMES*

Tommy, Timmy—at least it ain't Jimmy! (Parsons Technology Announcements 3.0 brochure.)

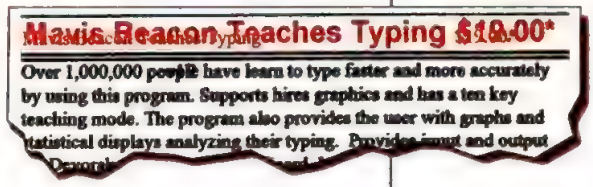
"Most of our product line is doing well, but the expanding touch pad on our PDA keeps opening unexpectedly."

Richard Tennant

Well, This Was Inevitable

Banana Productions (913-362-4590) is marketing a computer game called O.J.'s All-American Race To Acquittal. Play it and "you can participate in the American justice system, make a few million bucks and date fashion models. What more do you want from a computer game? Just watch your driving, or you could end up 100%, Absolutely Guilty."

Maybe Mavis Beacon should teach the typist for the Raceway Computers catalog how to do double spacing.



It's a Newt World

Four issues ago, this page referred to Newt Gingrich as "superconservative." A few readers told us to shut up and stick to what we know. So from now on, we'll refer to him as "laptop-loving."

If your entry is used, we'll send you $50 and a *PC Magazine* T-shirt. Send your entries to Abort, Retry, Fail?, *PC Magazine*, One Park Ave., New York, NY 10016-5802. Winners this issue: Robert Morelli, Brent Peterson, Carol Shields, Robert Swears, and Greg Taylor.

HIGH PERFORMANCE 75MHz DELL LATITUDE.

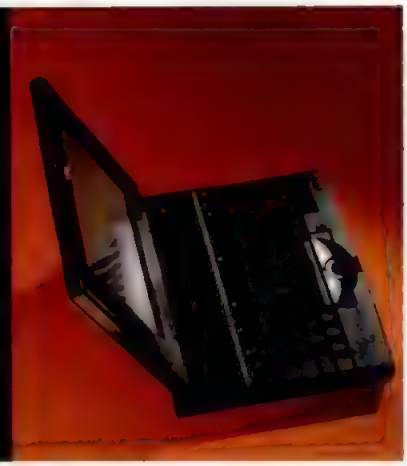
NOW ONLY $2299

Dell® Latitude™ IntelDX4™ 75MHz System

Business Lease*: $85/Mo.

- 9.5" Dual Scan Color
- 4MB RAM (20MB Max RAM)
- 260MB Upgradeable Hard Drive (524MB Max)
- $99 more for 2nd NiMH Battery (Slides into floppy drive to achieve extended battery life)
- 32-bit Local Bus Video, 1MB Video RAM
- 2 Type II/1 Type III PCMCIA Expansion Slots
- Preloaded Communications Software
- 6 Pounds
- 1-year Warranty*
- 30-day Money-back Guarantee*

Order Code: #800036



GET A 75MHz NOTEBOOK THAT'S LOADED. EVEN IF YOU'RE NOT.

Dell's featured computer artist is Mick Wiggins

Introducing the 75MHz Dell Latitude notebook. For just $2299, you get all the features of a more expensive notebook. Such as 32-bit local bus video and 1MB video RAM. An upgradeable hard drive. And a removable floppy drive that lets you slide in an optional second battery (available for $99) for double the battery life.

PC MAGAZINE EDITORS' CHOICE. Jan. 24, 1995 Dell Latitude 450C

Order today. And get a notebook that's really loaded.

TO ORDER, CALL NOW.

800-289-1210

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT • Sun 12pm-5pm CT

In Canada, Call 800-668-3021

http://www.us.dell.com/

Keycode #04038

DELL

intel inside

E TO GREAT LEN

XPS P100c POWER

Dell Dimension XPS P100c

A Pentium Processor-based 100MHz System

- Updated Pentium Chip
- Mini Tower Model
- [illegible] Memory
- 1GB Enhanced IDE Hard Drive (10ms)
- VS17 Monitor (17" CRT, NI)
- [illegible] 128 Graphics Accelerator [illegible]
- 4x Multi-[illegible] IDE CD-ROM Drive
- Sound Blaster 16 Sound Card
- Altec Lansing ACS-31 Speakers
- MS Office 4.3, MS Bookshelf [illegible] Express for MS Office
- 256KB Writeback Cache
- 3.5" Diskette Drive
- Spacesaver Keyboard
- MS-DOS 6.2/Microsoft Windows 3.1/Mouse

$3899

Business Lease: $140/Mo.

Order Code #500076

XPS P100c WORKSTATION

Dell Dimension XPS P100c

A Pentium Processor-based 100MHz System

- Updated Pentium Chip
- Mini Tower Model
- [illegible] EDO Memory
- 1GB Enhanced IDE Hard Drive (10ms)
- VS17 Monitor (17" CRT, NI)
- [illegible] 2MB [illegible]
- 4x Multi-session EIDE CD-ROM Drive
- 256KB Writeback Cache
- 3.5" Diskette Drive
- Spacesaver Keyboard
- MS-DOS 6.2/Microsoft Windows 3.1/ Mouse

★For the ultimate high [illegible] upgrade to [illegible] Memory for just $[illegible]

$3249

Business Lease: $120/Mo.

Order Code: 500075

XPS P90 WORKSTATION

Dell Dimension XPS P90

A Pentium Processor-based 90MHz System

- Updated Pentium Chip
- Mini Tower Model
- 16MB RAM
- 1GB Enhanced IDE Hard Drive (10ms)
- [illegible] Monitor (17" CRT, NI)
- 64-bit PCI 2MB DRAM Video Card
- 4x Multi-session EIDE CD-ROM Drive
- 256KB Writeback Cache
- 3.5" Diskette Drive
- Spacesaver Keyboard
- MS-DOS 6.2/Microsoft Windows 3.1/Mouse

★Add a Conner 200V4 [illegible] backup unit for just $[illegible]

$2949

Business Lease: $109/Mo.

Order Code #500074

XPS P75 OFFICE WORKSTATION

Dell Dimension XPS P75

A Pentium Processor-based 75MHz System

- Updated Pentium Chip
- Mini Tower Model
- 16MB RAM
- 1GB Enhanced IDE Hard Drive (10ms)
- VS15 Monitor (15" CRT, NI)
- 64-bit PCI 2MB DRAM Video Card
- 4x Multi-session EIDE CD-ROM Drive
- MS Office 4.3, MS Bookshelf Visio Express for MS Office
- 256KB Writeback Cache
- 3.5" Diskette Drive
- Spacesaver Keyboard
- MS-DOS 6.2/Microsoft Windows 3.1/Mouse

★Add a 3COM ELINK III (TPO) [illegible] Network Interface Card for just $[illegible]

$2549

Business Lease: $94/Mo.

Order Code #500073

XPS P90 OFFICE SYSTEM

Dell Dimension XPS P90

A Pentium Processor-based 90MHz System

- Updated Pentium Chip
- Mini Tower Model
- 8MB RAM
- 540MB Hard Drive (12ms)
- VS15 Monitor (15" CRT, NI)
- 64-bit PCI 2MB DRAM Video Card
- 4x Multi-session EIDE CD-ROM Drive
- MS Office 4.3, MS Bookshelf [illegible] Express for MS Office
- 256KB Writeback Cache
- 3.5" Diskette Drive
- Spacesaver Keyboard
- MS-DOS 6.2/Microsoft Windows 3.1/Mouse

★Add a Creative Labs [illegible] 16 Sound Card and Altec Lansing ACS-31 Speakers for just $178 more

$2349

Business Lease: $87/Mo.

Order Code #500072

MULTIMEDIA P75 UNDER $2000

Dell Dimension XPS P75

A Pentium Processor-based 75MHz System

- Updated Pentium Chip
- Mini Tower Model
- 8MB RAM
- 540MB Hard Drive (12ms)
- VS15 Monitor (15" CRT, NI)
- 64-bit PCI 1MB DRAM Video Card
- 4x Multi-[illegible] CD-ROM Drive
- [illegible] Speakers for Sound Card
- Altec Lansing ACS-[illegible] Speakers
- 256KB Writeback Cache
- 3.5" Diskette Drive
- Spacesaver Keyboard
- MS-DOS 6.2/Microsoft Windows 3.1/Mouse

★Increase your available [illegible] upgrade to 2MB DRAM for $59 more

$1999

Business Lease: $74/Mo.

Order Code #500071

466D POWER STATION

Dell Dimension 466D

IntelDX2™ 66MHz System

- 8MB RAM
- [illegible] MB Hard Drive [illegible]
- VS15 Monitor (15" CRT, NI)
- Accelerated Local Bus Video with 1MB DRAM
- 3.5" Diskette Drive
- Spacesaver Keyboard
- MS-DOS 6.2/Microsoft Windows 3.1/Mouse

★Add an [illegible] modem for just $[illegible]

$1499

Business Lease: $55/Mo.

Order Code #400051

466D WORKSTATION

Dell Dimension 466D

IntelDX2 66MHz System

- 4MB RAM
- 365MB Hard Drive (12ms)
- VS15 Monitor (15" CRT, NI)
- Accelerated Local Bus Video with 1MB DRAM
- 3.5" Diskette Drive
- Spacesaver Keyboard
- MS-DOS 6.2/Microsoft Windows 3.1/Mouse

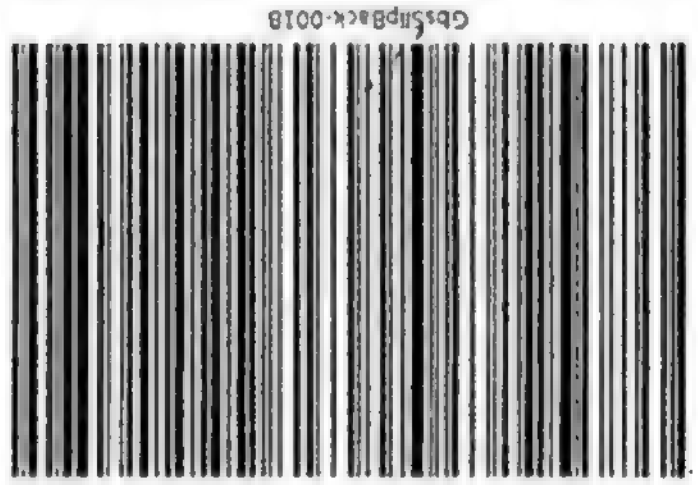
★Double your RAM for just $150 more

$1299

Business Lease: $48/Mo.

Order Code #400050

[illegible] copy of our Guarantees or Limited Warranties, please write Dell Computer Corp., 2214 W. Braker Lane, Building 3, Austin, TX 78758. *On-site service provided by BancTec Service Corp. On-site service may not be* The Intel Inside logo and Pentium are registered trademarks and IntelDX2 and IntelDX4 are trademarks of Intel Corporation. MS-DOS, MS, Windows and Microsoft are registered trademarks of Microsoft Corporation. [illegible] rights reserved.



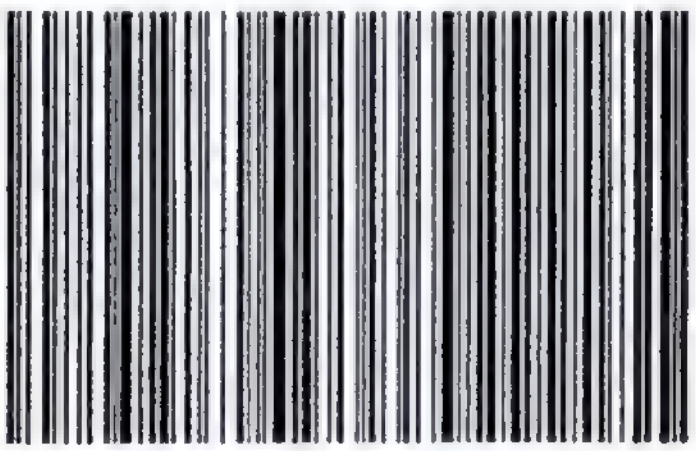
Back

1. Follow instructions on the other side

Inverted Back

1. Follow instructions on the other side

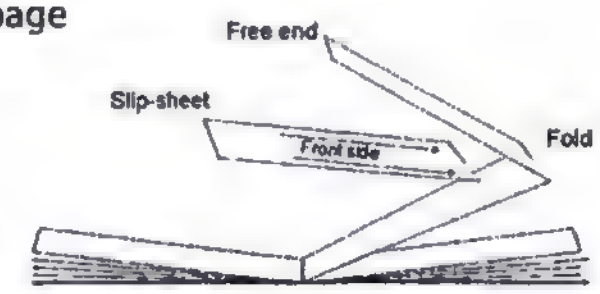
Folded edge of the page



GbsSlipSheet-001

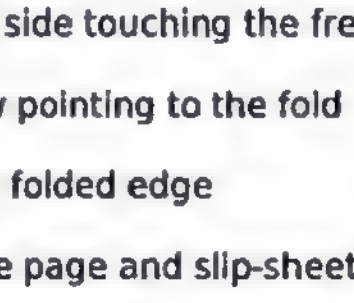
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



WE'VE GONE

Dell's featured computer artist is Mick Wiggins.

Dell Dimension XPS P120c

A Pentium® Processor-based 120MHz System

- Updated Pentium Chip
- Mini Tower Model
- 16MB EDO Memory
- 1GB Enhanced IDE Hard Drive (10ms)
- VS17 Monitor (17" CRT, NI)
- Imagine 128 Graphics Accelerator with 4MB VRAM
- 4X Multi-session EIDE CD-ROM Drive
- Sound Blaster 16 Sound Card
- Altec Lansing ACS-5 Speakers
- 256KB Pipeline Burst SRAM Cache (512KB Max)
- MS® Office 4.3, MS Bookshelf, Visio Express for MS Office
- 3.5" Diskette Drive
- Spacesaver Keyboard
- MS-DOS 6.2/Microsoft Windows 3.1/Mouse

$4299

Business Lease: $155/Mo.

Order Code #500077

intel inside

*Guarantees available in the U.S. only for registered owners of Dell Dimension systems purchased after 8/1/93 and Dell Latitude systems purchased after 8/8/94. †For a complet available in certain remote locations. ◊Business leasing arranged by Leasing Group, Inc. *Prices and specifications valid in the U.S. only and subject to change without notice. FORTUNE GLOBAL 500 is a trademark of the Time Inc. Magazine Corp. Back cover screen visual ©1995 Electric Image, Inc. ©1995 Dell Computer Corporation. All*

OUR DAY IN HELL BEGAN WITH A HOT CUP OF COFFEE,

AND ENDED WITH A TOAST.

"★★★★★"
Best Overall
PC Computing
Torture Test

Here's to our indestructible Dell® Latitude XP™ notebook. Back from *PC Computing*'s Notebook Hell and winner of the Best Overall Award in their Annual Notebook Torture Test.

For ten weeks they baked, froze, dropped, even spilled coffee on thirteen notebooks. They analyzed usability and measured battery life. All to separate the wheat from the chaff as it were. And early on, when Toshiba and Compaq were begging for mercy, we were begging for more.

In fact, the Dell Latitude XP was the only notebook to receive five stars. As the magazine remarked, "the Latitude XP braved our durability tests with nary a scratch – surviving in better shape than any notebook we tested." Then they pronounced it "the best traveling six-pound machine you'll find."

Call today to order the Dell Latitude XP. Because if you're the type to put your notebook through hell, you should get one that's already been there.

TO ORDER, CALL NOW.

800-234-7759

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT • Sun 12pm-5pm CT
In Canada, Call 800-668-3021
http://www.us.dell.com/

Keycode #04036

DELL

DELL LATITUDE XP INTELDX4™ 100MHz SYSTEM

$3299

Business Lease: $122/Mo.

- 9.5" Dual Scan Color
- 8MB RAM (36MB Max RAM)
- 340MB Removable Hard Drive (810MB Max)
- Smart Lithium Ion Battery with Advanced Power Management
- 32-bit Local Bus Video, 1MB Video RAM
- 2 Type II/1 Type III PCMCIA Expansion Slots
- 5.9 Pounds
- 3-year Warranty†
- 30-day Money-back Guarantee*
- Optional Advanced Port Replicator Available

★*Upgrade to 16MB RAM for just $499 more.*

Order Code #600025

DELL LATITUDE XP INTELDX4 100MHz SYSTEM

$3799

Business Lease: $137/Mo.

- 9.5" Dual Scan Color
- 8MB RAM (36MB Max RAM)
- 810MB Removable Hard Drive
- Smart Lithium Ion Battery with Advanced Power Management
- 32-bit Local Bus Video, 1MB Video RAM
- 2 Type II/1 Type III PCMCIA Expansion Slots
- 5.9 Pounds
- 3-year Warranty
- 30-day Money-back Guarantee
- Optional Advanced Port Replicator Available

★*Pre-install MS® Office Pro and add a case and 14.4 X-Jack modem for only $375 more.*

Order Code #600026

DELL LATITUDE XP INTELDX4 100MHz SYSTEM

$4199

Business Lease: $151/Mo.

- 9.5" Active Matrix Color
- 8MB RAM (36MB Max RAM)
- 340MB Removable Hard Drive (810MB Max)
- Smart Lithium Ion Battery with Advanced Power Management
- 32-bit Local Bus Video, 1MB Video RAM
- 2 Type II/1 Type III PCMCIA Expansion Slots
- 6.1 Pounds
- 3-year Warranty
- 30-day Money-back Guarantee
- Optional Advanced Port Replicator Available

★*Order an additional smart lithium ion battery for $199 more.*

Order Code #600012

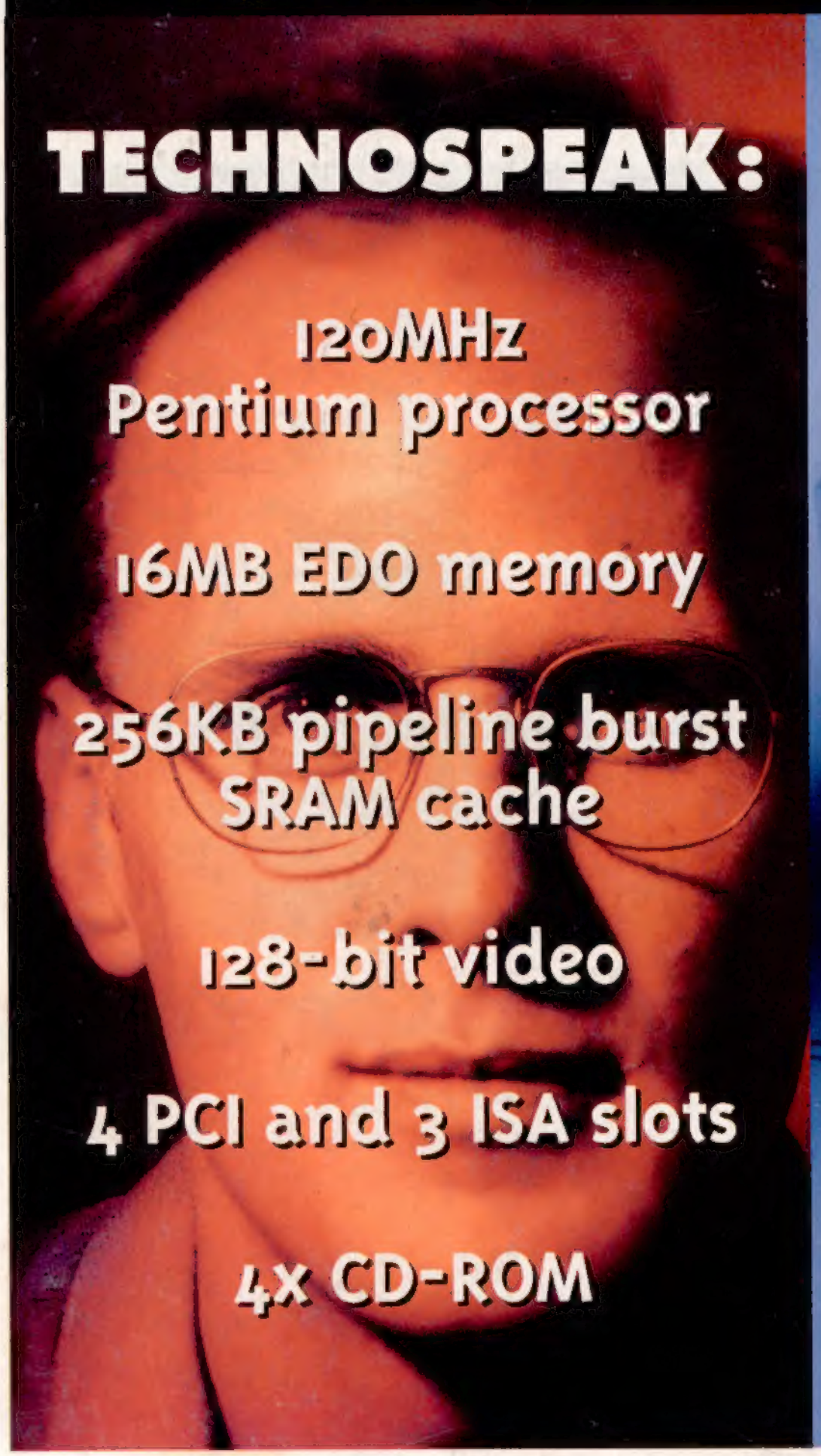
INTRODUCING THE DELL DIMENSION XPS P120c.

$4299

Dell Dimension™ XPS P120c
A Pentium® Processor-based 120MHz System

- Updated Pentium Chip
- Mini Tower Model
- 16MB EDO Memory
- 1GB Enhanced IDE Hard Drive (10ms)
- VS17 Monitor (17" CRT, NI)
- Imagine 128 Graphics Accelerator with 4MB VRAM
- 4X Multi-session EIDE CD-ROM Drive
- Sound Blaster 16 Sound Card
- Altec Lansing ACS-5 Speakers
- 256KB Pipeline Burst SRAM Cache (512KB Max)
- MS® Office 4.3, MS Bookshelf, Visio Express for MS Office
- 3.5" Diskette Drive
- Spacesaver Keyboard
- MS-DOS® 6.2/Microsoft® Windows® 3.1/Mouse

Business Lease◊: $155/Mo.
Order Code #500077



And not just fast. The Dell Dimension XPS P120c features a 120MHz Pentium chip – the fastest Pentium chip on the market. Plus we designed the overall architecture of the P120c to take full advantage of the CPU. We equipped it with 16MB EDO memory and up to 512KB pipeline burst SRAM cache, which dramatically increases the throughput between chip and cache. Added 4 PCI and 3 ISA slots. A 128-bit graphics accelerator. And a 4X CD-ROM drive.

It all adds up to radically improved performance for spreadsheets, databases, desktop publishing and multimedia. Speed and video performance you can't find in any other 120MHz PC – no matter how hard you look. So just tell your boss it'll increase the quality vector or something. And make sure you get one for yourself.

TO ORDER, CALL NOW.

800-232-8558

Mon-Fri 7am-9pm CT • Sat 10am-6pm CT
Sun 12pm-5pm CT
In Canada, Call 800-668-3021
http://www.us.dell.com/

Keycode #04035

DELL®

PC MAGAZINE LIBRARY